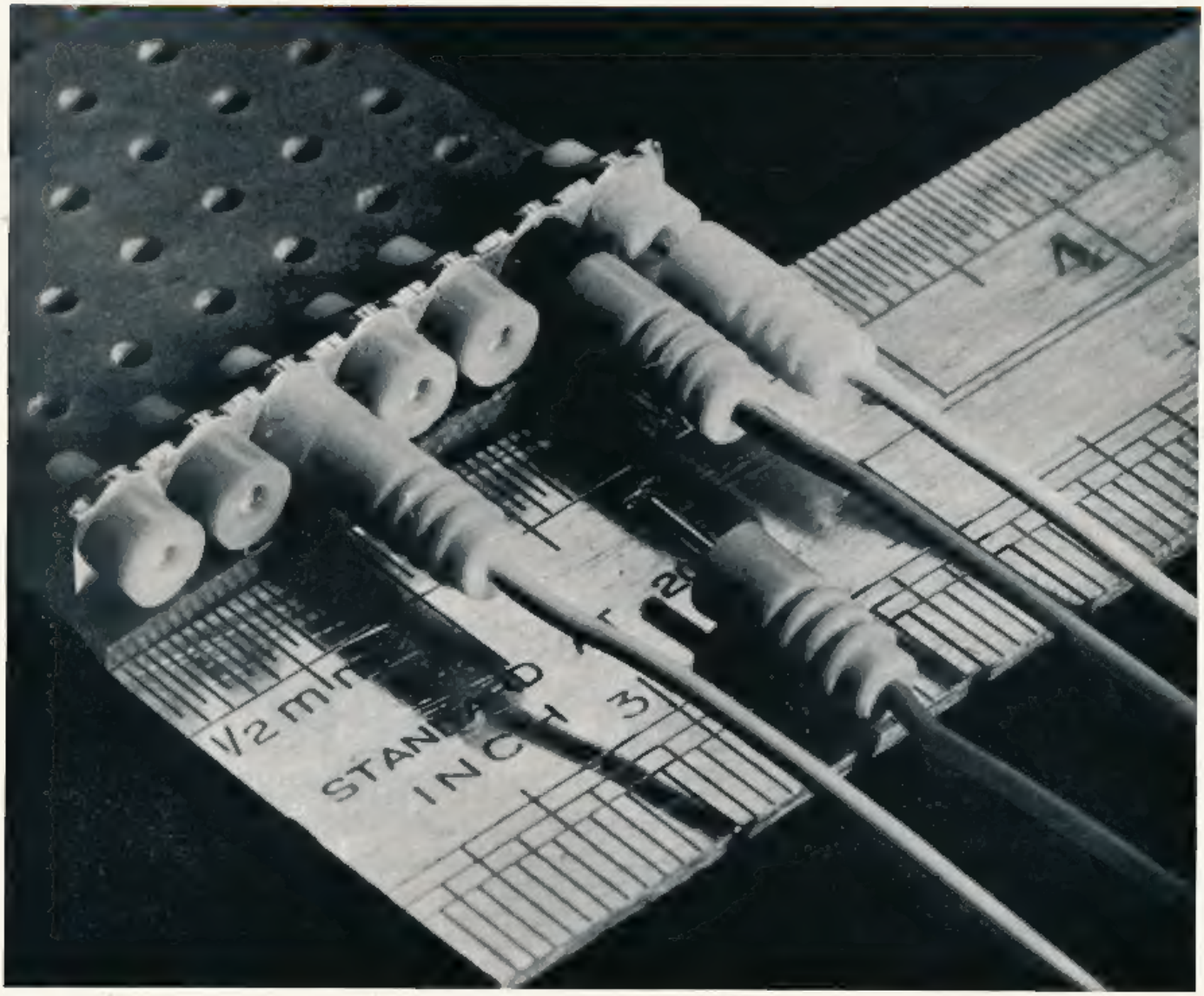
amateur radio

Vol. 38, No. 9

SEPTEMBER, 1970

Registered at G.P.O., Melbourne, for transmission by post as a periodical

Price 30 Cents



CRYSTALS

CITIZENS BAND and MODEL RADIO CONTROL FREQUENCY CRYSTALS

HC18 Miniature, ¼ inch spacing.

26.540 MHz.	26.995 MHz.	27.240 MHz.
26.590 MHz.	27.045 MHz.	27.245 MHz.
26.640 MHz.	27.095 MHz.	27.425 MHz.
26.690 MHz.	27.145 MHz.	27.740 MHz.
26.785 MHz.	27.185 MHz.	27.785 MHz.
26.790 MHz.		27.880 MHz.

PRICE $3.50 EACH

AMATEUR CRYSTALS

VHF Band — 144 MHz. FM

HC6 Holders, ½ inch spacing.

Channel A	Transmit	4,051.55 KHz.
Channel A	Receive	10,275.35 KHz.
Channel B	Transmit	4,055.5 KHz.
Channel B	Receive	10,285.71 KHz.
Channel C	Transmit	4,059.61 KHz.
Channel C	Receive	10,296.14 KHz.
Channel 4	Transmit	4,066.66 KHz.
Channel 4	Receive	10,276.57 KHz.
Channel 1	Transmit	4,056.33 KHz.
Channel 1	Receive	10,257.14 KHz.

PRICE $5.50 EACH

MARKER CRYSTALS

100 KHz. Marker	$12.00
1,000 KHz. Marker	$12.00
3,500 KHz. Marker	$5.50
5,500 KHz. Marker	$5.50

COMMERCIAL FREQUENCY CRYSTALS

HC6 Holders, ½ inch spacing.

2,182 KHz.	2,637 KHz.	4,535 KHz.
2,524 KHz.	2,739 KHz.	6,280 KHz.
2,603 KHz.	2,979 KHz.	6,735 KHz.
	4,095 KHz.	

PRICE $3.50 EACH

VIDEO PEAKING CHOKES

MINIATURE PIGTAILS, IRONCORE

15 uH, 22 uH, 27 uH, 33 uH, 39 uH, 47 uH, 56 uH, 68 uH, 82 uH, 100 uH, 120 uH, 150 uH, 180 uH, 220 uH, 270 uH, 330 uH, 390 uH, 470 uH, 560 uH. **Price 40c.** Postage 10c.

VERNIER DIALS

Ratio 8 to 1 Reduction, Scaled 0-10.

Type T 501 1½ inch diameter	$2.00
Type T 502 2 inch diameter	$2.75
Type T 503 3 inch diameter	$3.30

LOW PASS FILTERS

A "Cabena" Low Pass Filter will fix TVI. Cut-off frequency, 30 MHz.; attenuation at 60 MHz. better than 30 dB.; insertion loss, negligible. Impedance 50-72 ohms. **Price $11.50.** Postage 10c.

FIVE-CORE CABLE

5 x 5/0076. Ideal for Intercoms., Telephones, etc. New. **100 yd. rolls, $17** (postage 75c), or **20c yd.**

WIRE WOUND POTENTIOMETERS

50 watts, 200 ohms. **Price $3.00.**

SOLID STATE STEREO AMPLIFIER

8 watts r.m.s. per channel. Input for magnetic, crystal and ceramic type microphone, P.V. cartridges, tape recorder input and output, tuner input, stereo headphone jack. **Reduced to $65,** post $1.20.

STEREO HEADPHONES

Professional quality (well known brand). Large earpads, standard stereo plug, 8 ft. lead. **Price $6.75.** Postage 50c.

C-Type Compact CASSETTE TAPES

Well known make (suit all popular brands of Cassette Recorders). In plastic storage case.

C-60 60 minutes	$1.20
C-90 90 minutes	$1.95

BRAND NEW SPEAKERS

3DX	8 ohms	Nett Price	$3.95	Postage 20c
3DX	15 ohms	" "	$3.95	" 20c
6A7	8 ohms	" "	$5.50	" 40c
6A7	15 ohms	" "	$5.50	" 40c
8A7	8 ohms	" "	$7.20	" 40c
8A7	15 ohms	" "	$7.20	" 40c
12CMX	8 ohms	" "	$10.75	" 50c
12CMX	15 ohms	" "	$10.75	" 50c

DELCO TRANSISTORS

Type 2N441	Price $2.40.	Postage 10c
Type 2N278	Price $6.00.	Postage 10c
Type 2N301	Price $2.50.	Postage 10c

LT91 RECTIFIER

20 Volt 2 Amp.

Price $1.50. Postage 10c.

TE-16A TRANSISTORISED TEST OSCILLATOR

Frequency range: 400 KHz. to 30 MHz. in five bands. Modulated 800 Hz. sine wave. Modulation 30% approx. 5⅞ x 5⅞ x 3⅝ inches. Weight 1.5 lbs. **Price $24** tax paid, Postage 75c.

AUTO CAR AERIALS

Hirschmann, type 300N, side mounting, new.

Price $4.50. Postage 20c.

SIGNAL INJECTOR

Model SE2509. **Price $7.00.** Postage 20c.

INSTRUMENT CASE

Sloping front panel. Plastic case, metal front panel. 7⅛ x 4¼ x 5 inches. Suitable for radio, test equipment, projects, etc. **Price $3.50** inc. tax. Postage 10c.

PACK OF RESISTORS

100 Resistors of ½ and 1 watt rating.

Price $1.75. Postage 20c.

TAA300 INTEGRATED CIRCUIT

1 Watt Audio Amplifier

The **TAA300** is a monolithic integrated circuit for use as a complete a.f. amplifier. With a supply voltage of 9v., outputs of up to 1w. are obtainable into a load impedance of 8 ohms. A voltage range of 4.5 to 9 volts coupled with very low crossover distortion and low current drain (8 mA.) makes this circuit ideal for battery operation.

TAA300 Integrated Circuit, **$3.00**

Postage 10c

TRANSISTORS AND DIODES

OC71	75c	AF114	80c
OC44	90c	AF115	80c
OC45	90c	BC108	70c
AC125	80c	BC109	80c
AC128	80c	BF115	80c
BA100	30c	OA90	30c
OA91	20c	OA95	30c

Postage 10c

A.C. ADAPTOR—BATTERY SAVER

Type PS84—240 volts to 6 or 9 volts, 300 mA. **$12.50**

Type PS82—240 volts to 6 or 9 volts, 100 mA. **$8.50**

Postage 30c

SOLDERING IRONS

ADCOLA M70 1/8 inch tip, 240 volt	$8.00
ADCOLA M64 3/16 inch tip, 240 volt	$8.40
SCOPE 4 volts AC/DC, 100 watts	$6.40
MINISCOPE	$6.00
SCOPE De Luxe	$7.00

Postage 20c

SOLDERING IRON TRANSFORMER

240 volts/3.3 Volts, 100 V/A $6.40

Postage 40c

ERSIN SOLDER

Five-Core, 60/40	$2.50
Five-Core, 40/60	$2.20
Solder Pack, 42 inches	15c

Postage 20c

MICROPHONE CABLE

Type 15P1/24, E3748, 1/16 inch diam.

Price 15c yard, or **100 yds. $14.00**

STEP-DOWN TRANSFORMERS

Type 5506—240 volts to 115 volts, 20 watts	$12.00
Type 5578—240 volts to 115 volts, 40 watts	$12.50
Type 2184—240 volts to 115 volts, 100 watts	$16.30
Type 2166—240 volts to 115 volts, 250 watts	$32.00

Postage $1

MINIATURE SPEAKERS

2¼ inch	8 ohm V.C.	Price $1.50	Postage 20c
2½ inch	8 ohm V.C.	" $1.75	" 20c
2¾ inch	8 ohm V.C.	" $2.00	" 20c
3 inch	8 ohm V.C.	" $2.25	" 20c
4 inch	8 ohm V.C.	" $2.50	" 20c

HAM RADIO SUPPLIERS

323 ELIZABETH STREET, MELBOURNE, VIC., 3000

Phones: 67-7329, 67-4286 All Mail to be addressed to above address

Our Disposals Store at 104 HIGHETT ST., RICHMOND (Phone 42-8136) is open Mondays to Fridays, 10.30 a.m. to 5.0 p.m., and on Saturdays to midday.

We sell and recommend Leader Test Equipment, Pioneer Stereo Equipment and Speakers, Hitachi Radio Valves and Transistor Radios, Kew Brand Meters, A. & R. Transformers and Transistor Power Supplies, Ducon Condensers, Welwyn Resistors, etc.

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

SEPTEMBER, 1970
Vol. 38, No. 9

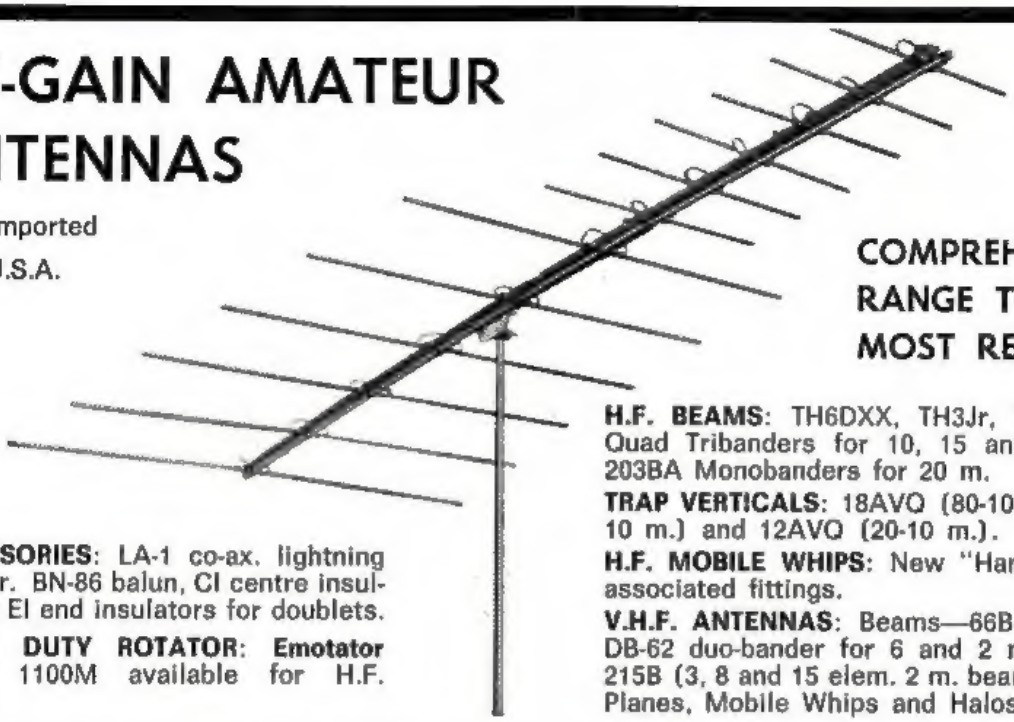
CONTENTS

COVER STORY

Our cover this month shows the latest in sub-miniature sockets and plugs. Manufactured by Oxley Developments Co. Ltd., U.K., they are designed for printed circuit board applications and employ a patented cone-lock principle to ensure reliable fixing of the socket tube, and the insulating bush in the mounting frame. Our illustration is by courtesy of R. H. Cunningham Pty. Ltd., who are the Australian agents for Oxley.

HY-GAIN AMATEUR ANTENNAS

Fully Imported
from U.S.A.



COMPREHENSIVE RANGE TO SUIT MOST REQUIREMENTS

H.F. BEAMS: TH6DXX, TH3Jr, TH3Mk3 and Hy-Quad Tribanders for 10, 15 and 20 m.; 204BA, 203BA Monobanders for 20 m.

TRAP VERTICALS: 18AVQ (80-10 m.), 14AVQ (40-10 m.) and 12AVQ (20-10 m.).

H.F. MOBILE WHIPS: New "Hamcat" Whips and associated fittings.

V.H.F. ANTENNAS: Beams—66B six elem. 6 m., DB-62 duo-bander for 6 and 2 m.; 23B, 28B and 215B (3, 8 and 15 elem. 2 m. beams). Also Ground Planes, Mobile Whips and Halos.

ACCESSORIES: LA-1 co-ax. lightning arrestor. BN-86 balun, CI centre insulators & EI end insulators for doublets.

HEAVY DUTY ROTATOR: **Emotator** Model 1100M available for H.F. beams.

BAIL ELECTRONIC SERVICES, 60 Shannon St., Box Hill North, Vic., 3129. Ph. 89-2213

N.S.W. Rep.: **MOSMAN RADIO SERVICES, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone 67-1650
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

SIDEBAND ELECTRONICS ENGINEERING

Prices below, subject to alteration without prior notice, are all for equipment, directly imported from the various factories, in stock all the time, no use to advertise otherwise:

YAESU MUSEN
FT-101 latest AC/DC all-band Transceiver, one demo. model available.
FT-DX-400 de luxe Transceiver, 500w. PEP, AC supply built in $525
FL-DX-400 Transmitter, 300w. PEP, AC supply built in $350
FR-DX-400 de luxe Receiver, 160 to 10 metre Ham bands $375
FR-DX-400 super de luxe model Receiver with all the available accessories built in, 500 Hz. CW filter, FM filter and FM discriminator and 2 and 6 metre solid state Converters $475
FT-200 economy Transceiver, with extra heavy duty AC power supply-speaker unit for 230-240-250v., adjustable $410
FL-DX-2000 Linear Amplifier, built-in AC supply and SWR meter $225
FL-2000B Linear Amplifier $375
6 or 2 mx solid state Converters, 10 mx output, as used in the FR-DX-400 super de luxe Receiver $25
FF-30-DX Low Pass Co-ax. Line Filter $15
500 Hz. CW Filter Kit, as used in the latest FT-DX-400 Transceiver $35
FV-DX-400 External VFO for the FT-DX-400 and FT-DX-100 Transceiver $90

SWAN
SW350C Transceiver with AC supply-speaker unit $530
SW350C with Swan 14-230 AC/DC power supply unit $600

HY-GAIN
Hy-Quad, triband cubical Quad, 10-15-20 mx, one co-ax. feedline $130
TH6DXX tri-band senior Beam, 10-15-20 mx, 1KW. AM $220
TH3JR tri-band junior Beam, 10-15-20 mx, 600w. PEP $120
14AVQ 10 to 40 mx four-band Vertical, 1KW AM $62
18AVQ 10 to 80 mx five-band Vertical, 1 KW AM $85

MOSLEY
TA33JR tri-band 10-15-20 mx junior Beam, 800w. PEP $105

NEWTRONICS
4-BTV 10 to 40 mx four-band Vertical, $60; with 80 mx top-loading coil, $80
CRYSTALS FT-1241 series, chan. 0-78, full box from 375 to 515 KHz. $15
Individual channels, 20c to $2, depending on frequency.

MOBILE WHIPS
WEBSTER Bandspanner, 10-80 mx centre-loaded, continually adjust. $55
MARK HW-40 Helical Whip for 40 mx, $20; HW-3 10-15-20 Helical, $35
Swivel Mount and Spring for flat surface mounting .... The Pair $10

ROTATORS
CDR Ham-M heavy duty Rotator with indicator-control unit, for up to 2 inch masts, the proven Amateur Rotator since 1955 .... $185
Eight conductor cable for same, ... per Yard 60c

ANTENNA NOISE BRIDGE
OMEGA TE-7-01 Bridge, for the serious antenna experimenter, gives resonance AND impedance in one operation $25

BALUNS, exact elect. duplicate of the Hy-Gain BN-86, locally made $12.50

FILTERS: KOKUSAI Mechanical Type, 500 Hz. CW pass band $20

MIDLAND Products
27 MHz. ONE WATT hand-held Transceivers, three channels available, tone call signal for CW operation, battery voltage meter, audio squelch, with batteries, carrying case and strap, earpiece, **P.M.G. approved type**, with crystals for 27.240 MHz. operation **under P.M.G. licence** .... per unit $37.50
SWR and Power Meter, with two meters to read forward and reflected waves simultaneously, 52 ohm impedance, 2 kw. power $20
Field Strength Meter, 5-band 1 to 300 MHz., telescop. whip, earpiece $10
Mobile type PTT Dynamic Microphone, coiled cord, plug, high impad. $10
More MIDLAND Products expected, desk microphones, with and without built-in pre-amplifiers, co-ax. connectors.

CO-AX CABLE: All 52 ohm type, prices per foot, any lengths:
3/16 inch diam. Type RG-58-U, 10c; 3/8 inch diam. type RG-8-U, 20c
3/8 inch diam. type RG-214-U, **silvered** shield and inn. conduct., 30c
TRANSFORMERS: Still certain types of NATIONAL Transformers and Chokes in stock at give-away prices, ask for list and literature and pictures of all the above goodies. Sales tax included in all prices but postage, freight, insurance or registration are extras!!

SIDEBAND ELECTRONICS ENGINEERING

Proprietor: ARIE BLES

P.O. BOX 23, SPRINGWOOD, N.S.W., 2777

Telephone (STD 047) Springwood 511-394, not part of the Sydney telephone exchange, in the Blue Mountains 50 miles West of the Big Smoke.

EIMAC's new family of outstanding power tetrodes offers 13 impressive features:—

(1) High linearity. 3d order products −40dB or better.
(2) Low input capacitance. Typically, 45pF.
(3) Over 600 watts measured output at 865 MHz.
(4) Very high gain-bandwidth product. Over 125 MHz.
(5) Low grid interception in linear amplifier service.
(6) Low drive. Typically 40 volts for class AB-1 service. Easily driven at 150 MHz with 5 watt solid state device.
(7) Plate dissipation up to 800 watts. Both air and liquid cooling available.
(8) Coaxial base adapter available.
(9) Shock-resistant design for rugged service.
(10) 20 kW pulse output at 430 MHz.
(11) Very low cathode lead inductance.
(12) 5-pin base adapted for heat-sink cooling.
(13) High grid and screen dissipation ratings.

The unique 4CX600 family is an exciting result of EIMAC's CAD (computer-aided-design) program for ceramic/metal tetrodes. Closely controlled parameters permit intermodulation distortion limits to be included as a defining tube characteristic, establishing new criteria of performance.

EIMAC's advanced segmented cathode and electron focussing combine with an unusually high figure of merit in this family, providing you with tubes useful in widely diversified services: linear amplification, high reliability aircraft-to-ground communication, wideband distributed amplifier service in airborne ECM gear, and r-f pulse application.

Another example of EIMAC's ability to provide tomorrow's tube today! Here are the numbers to prove it:

TUBE TYPE	FIL. VOLTS	RATED TO (MHz)	BASE	COOLING	MAX. RATINGS Plate Volts	MAX. RATINGS Plate Amperes	TYPICAL POWER OUTPUT (150 MHz)	USEFUL FOR:
4CX600B	6.0	890	5-PIN SPEC.	Air	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CX600F	26.5							
4CW800B	6.0	890	5-PIN SPEC.	Liquid	3000	0.6	750W	WIDEBAND AMPLIFIER SERVICE
4CW800F	26.5							
4CX600J	6.0	150	OCTAL SPEC.	Air	3000	0.6	750W	CLASS AB-1 LINEAR SERVICE
8809								

More? Our Application Engineering Department's ability to design tube into circuit means less engineering time for you. For all-around capability, talk to EIMAC. For circuit and application information on these new power tetrodes, write to Varian for our new, free application bulletin No. 14, *Using the 4CX600 Family Tetrodes.*

varian PTY LTD
electron tube and device group
38 Oxley Street, Crows Nest, N.S.W., 2065. Phone 43-0673.
679 Springvale Road, Nth. Springvale, Vic., 3171. Phone 560-6211.
Suite 1, 339 Coronation Drive, Toowong, Qld., 4066. Phone 71-3277.
10 Stirling Highway, Nedlands, W.A., 6009. Phone 86-7493.

ETD 170

★ Stocktake Sale ★

- Swan 350C Transceiver $413.85
- Swan SW400 Transceiver 405.00
- Swan TV2 Transverter 290.40
- Swan A.C. Power Supply-Speaker 85.00
- Hallicrafters SX101A Receiver 250.00
- Hallicrafters HT37 Transmitter 140.00
- Pierce Simpson Marine Transceiver, 80 watts 350.00
- Pierce Simpson, 40 watts 189.00
- Swan VX2 Vox Unit 39.25
- Swan C.W. Filter 32.00
- Duke 5 Transceiver 399.75
- Hallicrafters CB5 .... 45.00
- Swan 420 V.F.O. 140.00
- C.D.R. Rotator 45.00
- Pierce Simpson Depth Sounder 99.00
- Jackson Transmitter Condenser, 300 pF. 5.00
- " " " 100 pF. 4.50
- Swan Carrier Switch and Trimmer 85c
- Jackson Trimmers, Ceramic 1.25
- Swan Drive Drums 1.25
- B. & W. Plate Chokes (Linear) 3.75
- B. & W. Filament Chokes (Ferite, G.G.) 7.50
- B. & W. Phase Shift Network 4.50
- Dow Key Pre-Amps. 4.50
- Electronic TR Switches 5.20
- Dow Key Co-ax. Switches 6.25
- Dow Key Relay Coils 1.25
- Coil Stock, B. & W. 80c
- Hansen S.W.R. Bridges 12.00
- LED Two-Tone Oscillators 16.00
- Dipole Centre Insulators 85c
- Swan 350 pF. Load Capacitors 3.50
- Polar Ceramic Air Trimmers 95c
- Transmitter Crystals 2.10
- 100 KHz. Crystals (Cal.) 4.50
- Marine Radio Crystals 2.50
- Alternator Diodes, 50 Amp. 2.75
- OC35 Transistors 4.37
- 10 Volt Zener Diodes 1.70
- PL259 Co-ax. Connectors 80c
- 3-contact Mike Connectors (screw type) 80c
- Bay Roy all weather Co-ax. Relay 16.00
- English Sceptor Depth Sounder 29.00

★ Stocktake Sale ★

- Swan Sideband Selector Kit $16.00
- Swan Mobile Mounting Kit 12.00
- Swan Bal. Mod. Transformer 1.28
- Crystal Mechanical Filter 8.00
- ADY26 Transistors, 35 Amp. 4.37
- Jones Plugs, 12-pin, Swan 80c
- Jones Sockets 80c
- 2N1522 Transistors 4.25
- 2N1518 Transistors 4.25
- Sigma Relays 2.05
- 10K Push-Pull Switch Pots 80c
- Jabel 4-pole Switch 50c
- Hammarlund HFA-140 Condenser 1.25
- B. & W. Co-ax. Switches 6.50
- TS12/40 Transformer 1.68
- 3-contact Jack Plugs 80c
- 3-contact Socket 75c
- 5 watt 4.7 ohm Resistors 18c
- Swan 350 Main Tuning Knob, Metal 80c
- Swan Main Tuning Knob 25c
- 0-50 Micro. Amp. Meter 4.50
- Swan Meters, all Models 12.75
- 21ZA Mobile Mike (Ceramic, P.T.T.) 12.00
- Swan 240V. A.C. Power Supply Transf. 15.00
- RG10 Q Multiplier 26.00
- CR45 Receiver 35.00
- RG8U Cable .. .. yd. 52c
- RG58U Cable .... yd. 24c
- TA31 Junior Beam 33.00
- TA32 Junior Beam 38.00
- TA31 and 32 Conversion Kits 33.00
- Hy-Gain 2 Metre Beam 30.50
- Swantenna Mobile, All Band 72.00
- Hallicrafters SX146 Receiver 334.00
- GOTHAM FULL SIZE BEAMS:
  - Y203 20 Metre 3 Element 45.00
  - Y153 15 Metre 3 Element 31.00
  - Y104 10 Metre 4 Element 37.00
  - Y69 6 Metre 9 Element 59.00
  - Y212 2 Metre 12 Element 53.00
  - Triband Quad 70.00
- SWAN HORNET:
  - TB750-3 Triband, 1.5 KW. 146.00

Note.—All above Prices plus Sales Tax except Hallicrafters SX101A and HT37.

W.F.S. ELECTRONIC SUPPLY CO.

12 BOWDEN STREET, NORTH PARRAMATTA, N.S.W., 2151 Phone 630-1621

FEDERAL COMMENT:

THE AMATEUR'S CODE

Over the years, the A.R.R.L. Handbook has made a feature of the Amateur's Code, and I can recall previous editorials in this magazine on the same subject. The code is, or should be, known to all Amateurs, and it is left to the individual to decide whether or not he follows it as his conscience may dictate, as on most points it is within his own control.

There is, however, one point where circumstances are such that outside influences can affect his thinking. This point is the fifth in the code, namely: "The Amateur is Balanced . . . Radio is his hobby. He never allows it to interfere with any of the duties he owes to his home, his job, his school, or his community."

After close on 20 years in association with W.I.A. affairs, I am firmly convinced that in all spheres, both on a Divisional and Federal level, the average Amateur expects far more than can be reasonably expected from those who bear office in the Institute. What the cost must be either in cash or time, irrespective of whether the office-bearer is an employee or self employed, does not bear thinking about, but however it is calculated, the fact remains that the office-bearer, whoever it may be, is neglecting some other facet of his life.

Whilst it is admitted that some self-sacrifice is expected when nominating for office, very few realise just what they are committing themselves to do. The Federal Executive was well aware of the problem when they submitted a proposal to the Federal Council last Easter that a full-time paid Secretary/Manager was required to handle the routine work of the Federal body, and the longer it was left the worse the position would become, until such time that the work of the Federal body would grind to a halt due to sheer complete over load.

Although not completely rejected, little or no useful discussion eventuated, the crux of the matter being that members could not afford the expense of such an employee of the Institute. It was left to Federal Executive to formulate a policy for future consideration, thus effectively increasing the work load on that body.

I now submit that it is time for the members of the W.I.A. to do something concrete to help their office-bearers to recover their balance, firstly by undertaking some of the work to be done within their Divisions, and, secondly, by being prepared to meet the costs required to maintain a worthwhile and responsible Institute.

Remember, we are discussing not a suburban tennis club but THE WIRELESS INSTITUTE OF **AUSTRALIA.**

—K. E. Pincott, VK3AFJ.

MEASUREMENT OF R.T.T.Y. FREQUENCIES

DR. K. M. KELLY, VK4MJ*

During the past few months, the writer has become interested in r.t.t.y. and has been constructing a demodulator. During this exercise it became necessary to provide some method of obtaining accurately measured frequencies, preferably in the form of a good sine-wave. It seemed that the answer would be to construct a simple tunable audio oscillator, with sufficient tuning range to cover the commonly used r.t.t.y. frequencies, and accordingly this was commenced.

Ever tried to do this? It quickly became apparent that there were various catches. An oscillator which gives a good waveform tends to have low output, and cannot be tuned over a useful range without great variations in output. An oscillator which gives good output without much variation over the tuning range usually suffers in waveform. Finally, most oscillators which, in fact, do come up to the mark are relatively complicated to make, and then their calibration is not accurate enough unless considerable trouble is taken.

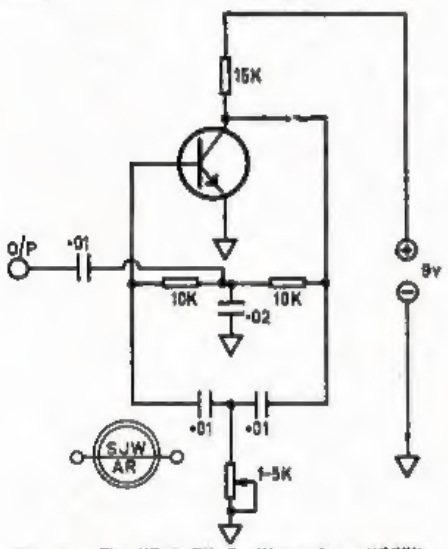


Fig. 1.— The "Twin-T" Oscillator from "QST".

After a grand search of the literature, and much experiment, I discovered a little talked about oscillator, the "Twin-T",[1] which proved to be very tame, and also simple to construct. The circuit as published in "QST" is reproduced here (Fig. 1) and was found to work well, with a frequency range of 2:1 easily obtained. A valve version was then constructed, and found to work equally well.

In Fig. 2 is shown the final article, which tunes from 350 to 550 cycles. The output transformer is actually a small modulation transformer, arranged to drive a neon lamp to strobe the teleprinter when adjusting the speed of the machine, and is not essential in any way to the argument which follows.

* 285 Monaco St., Surfers Paradise, Qld., 4217.

1. "QST," Sept. 1969, p. 37.

Enquiry from the local electric supply authority reveals that the maximum deviation in the frequency of the 50 cycle mains under ordinary conditions is ±0.1 cycle, which, if used for calibration, will give a maximum error of 6 cycles at 2975 cycles, which is the highest frequency we are interested in measuring for r.t.t.y.

CALIBRATION

The oscillator is allowed to warm up and the output is connected to the "external timebase" of an oscilloscope. A signal from the 50 cycle mains is connected to the vertical amplifier of the c.r.o. The fine adjustment pot. is set at mid point, and the main frequency control of the oscillator is swept until a Lissajou figure is obtained. These will indicate the multiples of 50 cycles and can be identified quite easily, by reference to the pretty pictures in the A.R.R.L. Handbook.

Now we must find the frequency in which we have the most interest—425 cycles. The Lissajou figure for this will be the one for (50 ÷ 2) × 17. In other words, there will be 17 peaks on the sides of the scope, and two peaks on the top or bottom.

Having now set the oscillator to 425 cycles, the input from the 50 cycle mains can now be removed, and the output of another audio oscillator (or the beat note from the station receiver) is substituted. Using the 425 cycle timebase, simple Lissajou figures for 2125 (5:1), and 2975 (7:1) can be measured with extreme accuracy. Note also that the centre frequency of 2550 (6:1) may be obtained. The alternate frequency also commonly used of 1275 comes with a 3:1 figure, and the shift frequency of 850 gives a 2:1 figure.

The fine adjustment pot. is used to make the figures stand still for easy counting, but if a good reduction drive is included on the main pot., the fine one may be omitted.

On the Creed teleprinter, the neon output will give a correct strobe on the governor wheel for 50 bauds at 425 cycles, but for 45.5 bauds the frequency would need to be adjusted to 386.45 cycles. There is no Lissajou figure for this frequency, but a figure of the ratio 23:3 gives 383.3 cycles, which is pretty close, with an error of less than 1%.

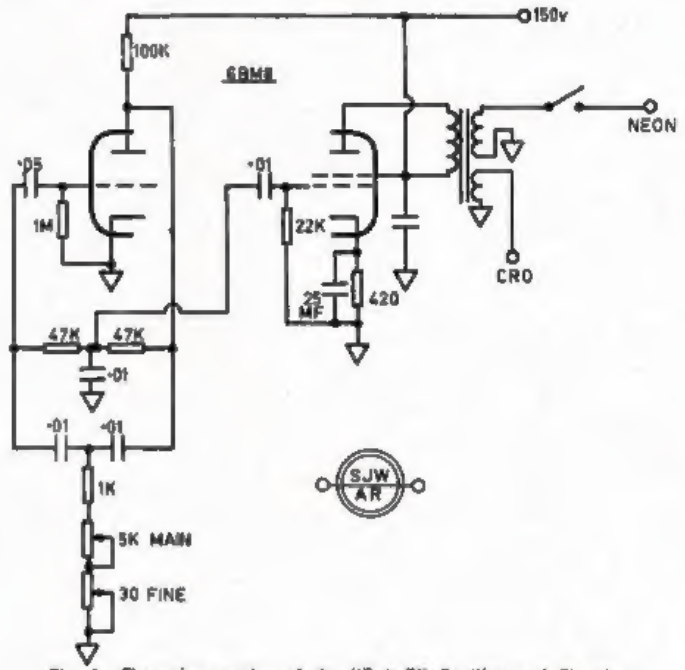


Fig. 2.—The valve version of the "Twin-T" Oscillator of Fig. 1.

PROVISIONAL SUNSPOT NUMBERS

MAY 1970

Dependent on observations at Zurich Observatory and its stations in Locarno and Arosa.

Day	R	Day	R
1	128	16	164
2	129	17	172
3	124	18	176
4	121	19	179
5	115	20	149
6	117	21	159
7	100	22	127
8	88	23	108
9	91	24	124
10	113	25	112
11	137	26	127
12	148	27	128
13	151	28	108
14	148	29	120
15	162	30	116
		31	129

Mean equals 131.1.

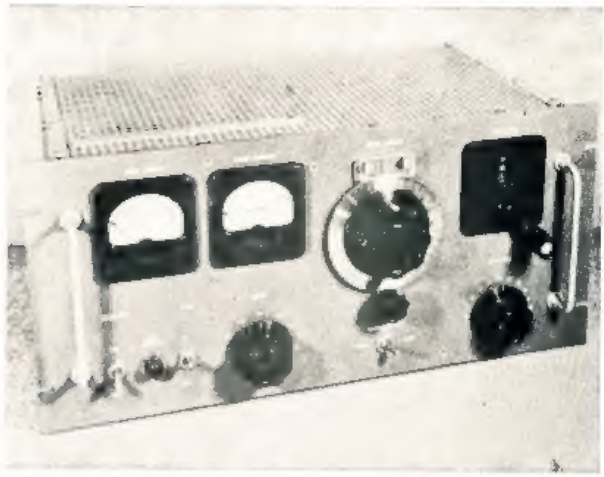
Smoothed Mean for Nov. 1969: 105.0.

—Swiss Federal Observatory, Zurich.

Home-Brew Five-Band Linear Amplifier*

A CONSERVATIVELY DESIGNED CIRCUIT USING TIME-PROVEN 811-As

HARRY R. HYDER, W7IV



IT is customary to preface a construction article with a few remarks about why the author decided to build rather than buy the equipment described. In my case, there's only one reason why I build radio equipment: I enjoy it.

I don't enjoy hole drilling or coil winding any more than an artist enjoys mixing paint or cleaning brushes. My satisfaction comes from creating something unique from my own mind and hands.

I read the construction articles in "Ham Radio" and other magazines every month, but I've never built equipment that exactly duplicates a published description. What I look for is not something to copy, but rather the construction hints and ideas that I can adapt to my own requirements.

This article is presented in that spirit. You may not wish to copy this linear amplifier, but you could do worse. Perhaps you'll find something you can use in your next construction project.

CIRCUIT DESCRIPTION

Parallel 811As are used in a grounded grid circuit (Fig. 1). In terms of watts-per-dollar of tube cost, the 811A must head the list. Some Amateurs complain of a short life for these tubes when operated at I.C.A.S. ratings as these are; however, I find it's easier to buy a couple of inexpensive tubes frequently rather than a single expensive tube occasionally.

The cathode circuit has a matching network to transform the 50 ohm input to approximately 150 ohms required by the tubes. A cathode matching network is often dispensed with, but it has its virtues. A 3:1 mismatch is frequently beyond the capability of some exciters. If the exciter doesn't have some power to spare, it may not be possible to drive the amplifier to full output without the network. With the matching network, the transmission line is "cold" and may be of any reasonable length. Some writers have reported that the matching network also improves amplifier linearity. Therefore, since it's simple and requires no tuning, it's cheap insurance.

The network is an L configuration on 80, 40 and 20 metres, changing to a pi network on 10 and 15 metres. The high effective cathode-to-ground capacitance, consisting of tube and wiring capacitance plus the distributed capacitance of the filament choke, precludes the use of an L network on the two higher frequency bands. The tapped 20, 40 and 80 metre cathode inductance is in the circuit at all times. On 10 and 15 metres, small self-supporting air-wound coils are connected in parallel with it. This is merely a switching convenience.

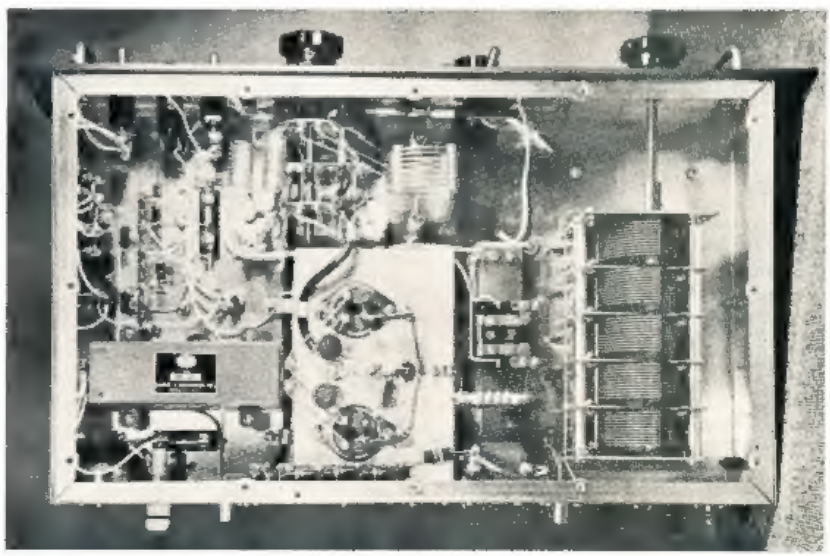
The plate tank coil is a roller-type inductor for the low frequency bands, with a series-connected small coil for 10 metres. The variable inductor permits adjustment for optimum Q on all frequencies.

The plate tank capacitor is from a BC375 tuning unit. Its original capacitance range was 23 to 140 pF. I wanted to reduce minimum tank capacitance on the high frequency bands to lower the loaded Q and increase efficiency. I carefully split the stator with a fine saw. Only one of the sections is used on the high frequency bands, reducing the minimum tank capacitance by about 12 pF. This decreases the loaded Q on 10 metres from 26 to 20, and on 15 metres from 19 to 15. The photos show the switching arrangements to cut in the second section. The contacts are from an old relay, and the solenoid is a 115v. a.c. unit I happened to have in my junk box. The solenoid is controlled by a front-panel switch.

The loading capacitor is a five-gang 420 pF. per section unit that came from an MN26 radio compass. Two sections in parallel are used on the higher frequencies; the remaining three are cut in by a relay controlled by the tank capacitor switch. The capacitor is available from Barry Electronics.

At 1500 volts, 811As require about 4.5 volts bias, which is supplied by a 4.7 volt zener in the filament return. This is less expensive and more reliable than a bias supply, and has a very low impedance. A 100 volt zener is also in the filament return, with a small amount of d.c. current bled through it. This provides full cut-off bias. It can be cut out by a front panel switch, or by external relay contacts.

The plate-current meter is also in the filament return, but reads plate current only; not total cathode current.

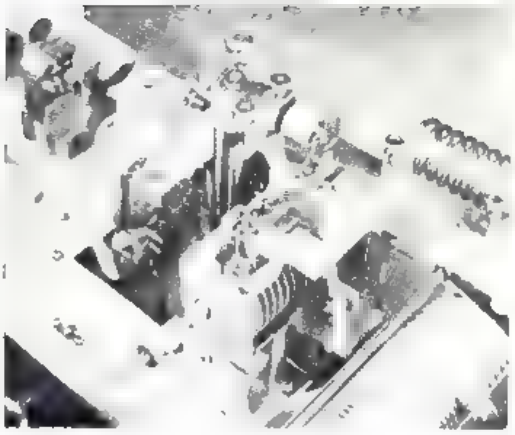


Bottom view of the Linear Amplifier. Note lead dress and method of securing cables.

* Reprinted from "Ham Radio," March 1970.

Left.—Circuit details and component layout of input section. Attention to detail results in a professional appearance.

Right.—Detail of the amplifier tank circuit. The small coil in the binding posts is the 10 metre inductor.



The grid-current meter is in the d.c. grid return.

The high-voltage bleeder consists of four 150K ohm 2-watt resistors in series, since it is not good practice to put more than about 500 volts across a single 2-watt resistor. I like redundant bleeders; should the one in the power supply open, the one in the amplifier will discharge the filter capacitors in a few seconds. A neon lamp indicates high voltage on the amplifier.

CONSTRUCTION

The chassis is aluminium, 10 x 17 x 3 inches. The 811As are mounted on a 4 x 6 x 1½ inch aluminium chassis upside down. I made these chassis sides and the meter shields from pieces bought in a scrap-metal yard.

The cover shield is cane-pattern sheet aluminium from a "do-it-yourself" department of a hardware store. This material is rather flimsy, so I stiffened it and improved the r.f. shielding with ½ x 1/16 inch aluminium strips on the outside. The ½ x ½ x 1/16 inch aluminium angle stock that holds the shield assembly was also obtained in the scrap metal yard, but the same material is sold as trim in most hardware stores.

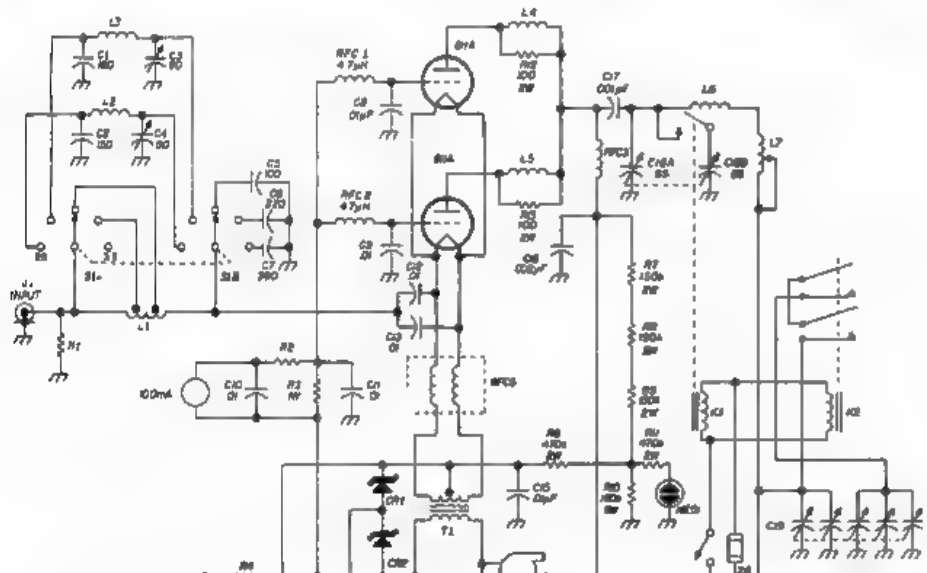


Fig. 1—Schematic of the 811A Grounded-Grid Linear Amplifier. Matching section in cathode circuit provides a 3:1 transformation ratio, assuring adequate drive from most exciters.

B1—Cooling fan (Japanese import; see photo).
C18A, B—Variable 2 section 65 pF per section, 0.07 inch spacing.
C19—5 section, 420 pF per section.
K1—See text.
K2—Relay d.p.s.t., 10A contacts, 117v a.c. coil.
L1—7½ turns 1½ inch diameter 2 inches long, tapped 3rd and 5th turns. Approximately 4.5 uH total inductance, tapped at 2.4 uH. and 1.2 uH.
L2—9 turns of number 14, ⅝ inch i.d., approximately 0.8 uH.
L3—12 turns of number 14, ⅝ inch i.d., approximately 1.0 uH.
L4, L5—3 turns of number 14, ⅝ inch i.d., wound around R12 and R13 (see photo).
L6—8 turns of ⅛ inch copper tubing, ⅜ inch i.d., 2 inches long.
L7—Inductor, variable, 16 uH. maximum (E.F. Johnson 229-202).
R2, R4—Adjust for correct reading of M1 and M2.
RFC1, RFC2—4.7 uH. pigtail.
RFC3—90 uH. 500 mA. (B. & W.).
RFC4—2.5 mH. pie wound.
RFC5—Filament choke (B. & W. FC-15).
SW1—2-gang rotary, 2 poles, 5 position.
SW2, SW4—S.p.s.t. toggle switch.
T1—Filament transformer, 117v. primary, 6.3v. 10a. secondary, c.t. (Triad F-21A).

WIRING

All power and control wiring should be installed first. Plan the wiring so that when the individual wires are joined into cables, the cables will run parallel to the main chassis dimensions. Strip each wire and tin it at both ends before placing it into the chassis. Leave a generous "service loop" when determining length; this makes parts replacement easy.

Lacing the cables adds a lot to the appearance. Flat nylon ties are good. Start at the cable centre and work toward the ends, bringing out individual wires as required.

Conductors in low level r.f. circuits consist of bare tinned bus bar. Output circuits are brass or copper strip about 0.02 inch thick. These strips should be secured with screws and nuts rather than solder. For appearance, sand the strips and spray them with clear lacquer.

THE PANEL

I prefer grey wrinkle to all other finishes. I purchase a blank panel with a black-wrinkle finish, complete all drilling, then spray it with "machine grey" lacquer. Several light coats are better than one heavy coat; the lacquer adheres better, and there's less tendency for the lacquer to fill in the original black finish. This makes for color standardisation, because no two grey-wrinkle panels are of the same hue, even from the same manufacturer's lot.

Another finish, used on my amplifier, requires nothing but a wire brush. Clamp the piece to a flat surface and make straight, even strokes with the brush. It produces a beautiful grained finish.

Whatever finish you use, handle the pieces with cloth gloves—fingerprints really stand out. Dust off the pieces and give them a couple of light coats of clear lacquer. Surfaces to be joined should be masked to obtain good electrical contact.

(Continued on Page 14)

PARALLEL A.C. CIRCUITS

A Typical Examination Question in A.C. Theory is answered in detail

LECTURE NO. 7

C. A. CULLINAN, VK3AXU*

Parallel a.c. circuits are very widely used in radio work and it is essential to understand such circuits thoroughly.

In a great number of cases parallel a.c. circuits include series circuits within themselves and it was for this reason that series a.c. circuits were dealt with firstly

Parallel a.c. circuits can be extremely complex so we will make this lecture a relatively simple question and work out the answers.

QUESTION

A parallel a.c. circuit consists of three branches—A, B and C.

Branch A consists of an inductance of 1 henry in series with a resistance of 100 ohms.

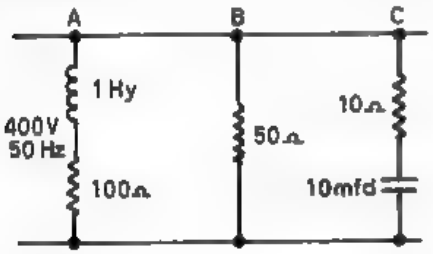
Branch B consists of a pure resistance of 50 ohms.

Branch C consists of a resistance of 10 ohms in series with a capacitance of 10 μF.

The impressed voltage is 400 and the frequency is 50 c.p.s. (Hz.).

1. Find the individual branch impedances Za, Zb, Zc.
2. Find the individual branch currents Ia, Ib, Ic.
3. Find the impedance Z of the circuit.
4. Find the total current flowing in the circuit.
5. Find the apparent power in the circuit.
6. Find the power factor.
7. Find the true power.

Comment.—The circuit will appear like this—



Question 1:

Branch A is a series a.c. circuit containing an inductance and a resistance. From our previous lecture on a.c. circuits we remember that the formula for series impedance is:

$$Z = \sqrt{R^2 + \text{Reactance}^2}$$

Therefore

$$Za = \sqrt{100^2 + XL^2}$$
$$= \sqrt{100^2 + (2 \pi f L)^2}$$
$$= \sqrt{100^2 + (2 \times 3.1416 \times 50 \times 1)^2}$$
$$= \sqrt{10{,}000 + 98{,}699}$$
$$= \sqrt{108{,}699}$$
$$= 329.6 \text{ ohms.}$$

$Zb = 50$ ohms.

* 6 Adrian Street, Colac, Vic., 3250.

● Continuing the series of lectures by C. A. Cullinan, VK3AXU, at Broadcast Station 3CS for students studying for a P.M.G. Radio Operator's Certificate.

$$Zc = \sqrt{R^2 + (XC)^2}$$
$$= \sqrt{10^2 + \left(\frac{1{,}000{,}000}{2 \pi \times 50 \times 10}\right)^2}$$
$$= 318.3 \text{ ohms.}$$

Question 2:

Find the currents in each branch.

Ohms Law for a.c. is: $C = E \div Z$.

For Branch A we have
$C = 400 \div 329.6$
$= 1.213$ amperes.

Branch B we have
$C = 400 \div 50$
$= 8$ amperes.

Branch C we have
$= 400 \div 318.3$
$= 1.254$ amperes.

Question 3:

Comment.—The impedance of the circuit can be found most readily from Ohms Law.

Impedance = Voltage ÷ Current.

However we do not know the total current and must work out section 4 of the question before we can answer section 3.

Question 4:

Comment.—Branch A contains an inductance and a resistance, so from our previous discussions of series a.c. circuits we know that Branch A will have a positive sign, also that Branch C, being capacitively reactive will have a negative sign.

The total current will be

$$I \text{ total} = \sqrt{Ib^2 + (Ia - Ic)^2}$$

Please Note: It is common practice to interchange the letter C and I for current, particularly amongst old-timers.

$$= \sqrt{8^2 + (1.213 - 1.254)^2}$$
$$= \sqrt{8^2 + (-0.041)^2}$$
$$= \sqrt{64 + 0.000181}$$
$$= 8.00$$

As the impedance of Branches A and C are almost equal but of opposite signs, they almost cancel each other, so have virtually no effect on the circuit. For practical purposes in this circuit the small nett amount of current need not be considered.

For the question, the components in Branches A and C were selected to bring about this result as a demonstration.

Therefore the answer to section 4 of the question is:

$$I \text{ total} = \sqrt{64}$$
$$= 8 \text{ amperes.}$$

Comment.—We are now in a position to answer section 3 of the question.

As stated earlier,

Impedance = Voltage ÷ Current
$= 400 \div 8$

Answer—
$= 50$ ohms.

Question 5:

The apparent power
$= E \times I$
$= 400 \times 8$
$= 3{,}200$ watts.

Question 6:

Comment.—The true power in a circuit is that available for work (heating, lighting, power for machinery, etc.).

$$\text{True Power} = \frac{\text{Apparent Power}}{\text{Impedance}}$$
$$= E \times I \times (R \div Z) \text{ watts,}$$

ratio $(R \div Z)$ in a right angled triangle is called the cosine of an angle or cos θ or power factor.

Therefore Power
$= E \times I \times \cos \theta$ watts.

However, in this particular circuit we have determined in answer to question section 3 that the impedance is the same as the resistance, therefore the power factor is unity.

Answer to Question 6: Power factor is unity.

Question 7:

Answer.—As the power factor is unity, then the true power is the same as the apparent power.

True Power
= Apparent Power × PF
$= 3{,}200 \times 1$
$= 3{,}200$ watts.

ANSWERS

1. Branch Impedance
   A = 329.6 ohms
   B = 50 ohms
   C = 318.3 ohms.
2. Current in Branch
   A = 1.213 amperes
   B = 8 amperes
   C = 1.254 amperes.
3. Impedance of the circuit
   = 50 ohms.
4. Total Current flowing in the circuit
   = 8 amperes.
5. Apparent Power in the circuit
   = 3,200 watts.
6. Power Factor of the circuit
   = Unity.
7. True Power in the circuit
   = 3,200 watts.

OBSERVATION

The impressed voltage is the same across each of the branches.

The current in the various branches need not be the same, but may differ considerably.

PIANO TYPE FREQUENCY METER

C. RENTON, AX4CR*

RECENTLY I made my debut into the ranks of the "Donald Duck" brigade by constructing a 40 metre single sidebander, my junk box supplying a large proportion of the parts required, especially an old U.S. Army transmitter tuning unit which supplied the aluminium front panel, most of the remainder of the cabinet, the v.f.o. band spread condenser with its dial and reduction gear, and the final tank condenser and coil.

As I knew very little about sideband techniques when I started the above project, I desire to gratefully acknowledge the very valuable assistance given to me by Jack AX4SF, who, besides assembling portion of the gear, did the etching and checking of the crystals and alignment and testing of the finished transmitter.

Having got this transmitter on the air and having a second army transmitter tuning unit on my hands, I felt the urge to "have a go" at making another sidebander to present to a certain young Ham who was having difficulty in getting long distance contacts with his Command a.m. gear. Not wishing to impose further on the time and good nature of Jack, I decided to try to carry out this second project single handed without the use of special instruments such as Jack had.

The diagram utilised for the above transmitter is somewhat similar to that of the 5 watt one as described in "A.R." January 1967, with, however, a further stage to increase the output, i.e. a 6DQ5 in the case of No. 1 transmitter and two 807s in parallel for the second one, which was arranged for 20 metres.

A 6AU6 and half a 12AT7 were utilised in the audio stage, the other half of the 12AT7 being the carrier oscillator valve. The balanced modulator includes two diode rectifiers ex computer boards. The main components of the crystal filter circuit are four FT243 crystals and a bifilar wound coil on an annular toroid former. The output of the filter feeds into a 6BA6 amplifier, this being followed by a 6BE6 mixer stage, 12BY7 driver and a final stage as mentioned above.

The v.f.o. has only one 6AU6 valve with the output frequency a multiple of the input one.

The tone oscillator was constructed as a separate item, a tone injection point being provided on the transmitter front panel.

The crystals utilised in the carrier oscillator and crystal filter stages were the low-priced FT243 type such as have been obtainable from the W.I.A. Store at Crow's Nest. The particular ones utilised for the second transmitter were branded 4950 KHz (those for the first transmitter being 4995 KHz.).

* 16 Wilson St., Booval, Qld., 4304.

USING THE PIANO

Not being in possession of a frequency meter, I decided to try utilising the household piano to check the frequencies of the crystals as I etched them, or, to be more exact, to compare the frequencies since, of course, no note on the piano quite reaches the megacycle level!

Having some time ago also tried my hand at a spot of piano tuning, I had acquired a list of frequencies corresponding to the 65 notes of the piano keyboard.

For the etching of the crystals I purchased a 52 cent bottle of a proprietary preparation which is utilised for removing rust stains from garments and which is labelled as containing approximately 10% hydrofluoric acid (incidentally, having to sign the chemist's poison register).

The bottle is plastic, as the fluoride would attack glass (and human skin) and the fluid must be handled with care.

I poured some into a cut-down plastic pill container, the latter being in a large diameter plastic lid in case of spillage. A spring type plastic clothes peg was utilised as tongs to grip opposite edges of the crystal during etching.

The crystal was immersed in the solution for only a carefully timed few seconds at first to observe the rate of frequency change, the crystal being quickly rinsed in water to stop the action after each etching.

By use of a simple crystal oscillator (similar to one described in connection with an article re grinding and etching of crystals in "R.T.H." October 1963) and the communications receiver, a preliminary check revealed which of the crystals would be nearest in frequency to one another for pairing, i.e. two pairs required, with a fifth one chosen for the carrier crystal.

The station receiver was switched on some time beforehand to prevent possibility of frequency drift during the tests, the b.f.o. being on.

Two crystals were then matched for the lower pair of the filter by alternately etching the slightly lower frequency one and checking with the beat note of its mate on the receiver, care being taken that such beat notes were on the same side of zero beat.

With both crystals etched to the one beat note, the note was adjusted to coincide with a low note on the piano. In my case (from memory) the note chosen was No. 30 piano key, which was listed as having a frequency of 146.83 cycles per second.

It had been recommended that the upper pair of filter crystals be etched 1800 cycles per second above the frequency of the lower pair.

The nearest note to provide that difference in frequencies was No. 75 key, shown as having a frequency of 1975.533 cycles per second. (1975 — 146 = 1829.)

The two higher frequency crystals were then carefully etched a little at a time until the beat note on the receiver corresponded as nearly as possible with the note of piano key No. 75.

Incidentally, it did not matter that the old piano was not quite tuned up to "concert pitch," as the **difference** between frequencies was my only concern in this instance.

The carrier oscillator crystal, which had been on very near the frequency of the lower crystal pair, was then loaded by rubbing solder (about ¼" diameter) on one side of the crystal to lower its frequency.

The correct procedure, I understand, is to place the carrier frequency at 20 dB. down on the lower slope or skirt of the filter crystal pass band, but not having the equipment to plot the pass-band (e.g. v.t.v.m. and r.f. probe) it was a matter of trial and (perhaps) error.

A 3-30 pF. Philips trimmer across the carrier oscillator crystal permits a slight adjustment of the frequency if required after assembly.

Jack invited me to bring the s.s.b. generator portion of the transmitter to his shack after I had completed it and his tests indicated that the crystals were satisfactory as regards pairing and frequency spacing, and that this front-end portion which included carrier oscillator, balanced modulator, crystal filter, 6BA6 amplifier and the audio portion should be okay.

The other stages of the second transmitter still await final adjustment and checking.

As a beginner, I was interested to learn that each individual stage of an s.s.b. transmitter may be tested by means of the communications receiver (only), this being useful if one stage becomes suspect. Thus, in the case of my 40 metre transmitter good signals were obtained on the receiver at the following positions, approximate frequencies being shown:

(a)	Input to v.f.o.	4 MHz.
(b)	Output of v.f.o.	12 „
(c)	Output of carrier osc. .	5 „
(d)	Output of mixer	7 „
(e)	Output of 12BY7 driver	7 „

(d) and (e) also, of course, constitute checks of the audio stage.

☆

FEEDBACK

The author of "Low-Cost Solid State Power Supply for Carphones and Pye Reporters," August 1970 "A.R.," advises that R1 and R2 (Fig. 1) should be transposed

Also, if the unit is slow in starting under load, put 0.1 μF. 100v. capacitor from collector to base in each transistor

PADDLE—YOUR OWN

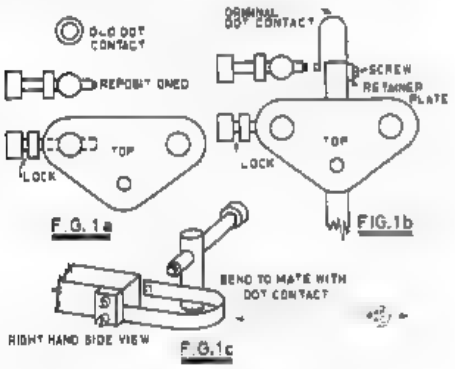
COL HARVEY, VK1AU*

The Eddystone Tear Drop Style Model 689 Semi-Auto Key, although apparently not popular as a "bug", can easily be modified to become a reliable paddle for use with an automatic keyer. An important feature is that it can also house (and shield) the solid state keyer described in "A.R." recently.

Modification is simple and involves drilling only one hole in the base plate to re-position the dot contact assembly (Fig. 1a). Modification involves:

- Removing the dot contact terminal.
- Removing the two small screws and the retainer plate which secure the spring steel dot weight assembly to the paddle.
- Removing the dot spring from the dot shaft.
- Discarding the dot buffer, the dot weights, shaft and spring.

In the centre of the channel underneath the keyer base, about ¾" from the trunnion which carries the dot travel stop, drill a clearance hole for the dot contact assembly. Make sure the contact assembly is clear of the trunnion and insulated from the base (Fig. 1a).



F.G.1a F.G.1b F.G.1c

Figs 1b and 1c show how to fit the topmost small screw, then the retainer plate, to the inboard end of the main assembly. Slip the end of the dot contact under the retainer plate so that the bottom screw goes through the holes in both the plate and spring contact. Adjust the position of the spring so that it can strike the re-positioned dot contact (Fig. 1b). Tighten both screws.

If two triangular slots are now filed into the front of the trunnions, near the top (Fig. 2) it will be possible to fit a matrix board or printed circuit board 3" x 1⅜" in the space previously occupied by the dot weights (Fig. 3). A small U shaped clip bolted into an existing threaded hole in the base secures the front of the board, which is slid into place sideways.

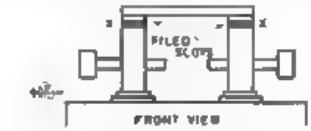


FIG. 2

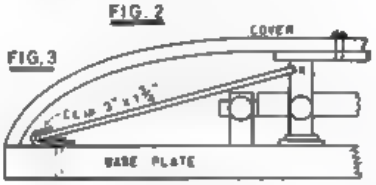


FIG. 3

A few moments work connecting dot and dash contacts to the matrix board, adjusting contacts and stops, and you are ready for practice—lots of it!

* 16 Leane St., Hughes, A.C.T., 2605.

CHANGE OF ADDRESS

W.I.A. members are requested to promptly notify any change of address to their Divisional Secretary —not direct to "Amateur Radio".

New Equipment

WEATHER PROOF MICROPHONE

Designed specifically for marine purposes, a range of weatherproof microphones branded "Vitavox" is now available in Australia.

Type B60 series microphones are completely enclosed in a rubber case and will withstand heavy handling and total immersion in water.

They are convenient to hold in a gloved hand, and a non-locking, "press-to-talk" switch, which has relay circuit contacts fitted, can be operated through the rubber case.

A cast aluminium-alloy stowage housing is made available to provide protection for the microphone when not in use.

A technical data leaflet giving full electrical characteristics is available on request from the sole Australian agents, R. H. Cunningham Pty. Ltd., 608 Collins St., Melbourne, Vic., 3000.

ELECTRONIC KEYER

The "Ele-Key" electronic keyer will provide automatic precision code at speeds from 8 to 60 words per minute. A solid state unit, the EK26 contains 11 transistors and 12 diodes, and has a built-in, monitor oscillator and phone jack and is fitted with a break-in QSO (vox-c.w.) terminal. Speeds are variable and can be operated semi or fully automatically

Available in a choice of power supplies: 230 a.c. or 6 v. x 2 d.c.; total weight 3 lb. 12 oz. Price $75 including sales tax. Further information from the Australian distributors: Bail Electronics Services, 60 Shannon St., Box Hill North, Vic., 3129.

HY-Q CRYSTALS

A new range of crystals designated the "Delta" Line, has been released by Hy-Q Electronics. They will be available in the frequency ranges of 4 to 105 MHz. (type QC6) and 10 to 105 MHz. (type QC18) and are capable of maintaining frequency over a temperature range of +5°C. to +55°C within ±5 parts per million (5 Hz. in every MHz.)

Full details are available from Hy-Q Electronics Pty. Ltd., 10-12 Rosella St., Frankston, Vic., 3199

5/8th WAVELENGTH VERTICALS*

R. L. CRAWSHAW, WA0NGV

MANY articles, manuals and even full-length books are devoted to antennas in general and as specifically applicable to the Amateur Radio service. Unfortunately, one of the most effective simple antennas for both local ground wave and long haul DX communications on the higher frequency bands is almost invariably conspicuous by its absence. Consequently, few Amateurs are familiar with the characteristics, design, or construction of the 5/8 wavelength vertical antenna.

It will be immediately apparent to most Amateurs that the 5/8 wavelength vertical antenna will provide an omnidirectional radiation pattern and a vertical polarised signal. And the antenna itself will be 2½ times as tall as the more familiar 1/4 wavelength vertical or groundplane. What will not be so obvious, to the uninitiated, is the even lower angle of vertical radiation, the gain obtainable and an additional improvement in reception due to increased capture area over the conventional 1/4 wavelength antenna.

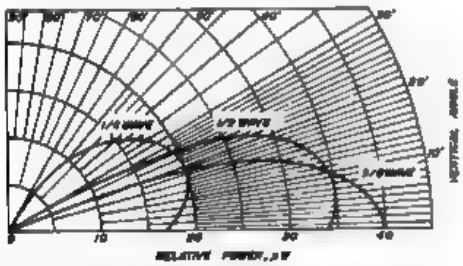


Fig. 1.—Low-angle radiation increases as antenna length increases up to 5/8 wavelength.

These characteristics have made the 5/8 wavelength antenna very popular in the land mobile services and in Amateur 2 metre f.m. operations where omnidirectional vertically polarised ground-wave communications with low power mobile stations are desired on a full-time basis.

Vertical antennas, almost invariably of the 1/4 wavelength variety, have been widely employed in the Amateur Radio service for DX communications where their low angle of radiation (assuming an adequate ground system) has proved very effective. Since the polarisation of radio signals is generally rotated significantly in the process of reflection, cross-polarisation losses are seldom a consideration in sky-wave communications.

Unfortunately, the additional advantages of the 5/8 wavelength antenna have seldom been employed for normal Amateur communications. True, a 150 ft. vertical for 75 metres or 80 ft. for 40 metres is beyond the facilities of most Amateurs. However, a 30 ft. antenna for 15 metres is well within Amateur capability, and 50 ft. (20 metres) is within the realm of reason.

THEORY OF OPERATION

As a short grounded vertical antenna is increased in length, the radiation lobe narrows, increases in tensity, and the angle of max. radiation lowers toward the horizon. As the length exceeds half wavelength, a secondary lobe of radiation at high vertical angles develops; but the low-angle radiation continues to increase until a height of 5/8 wavelength is reached (Fig. 1). With no equalising factor, as the length is increased beyond 5/8 wavelength, the high-angle radiation increases and the low-angle radiation decreases.

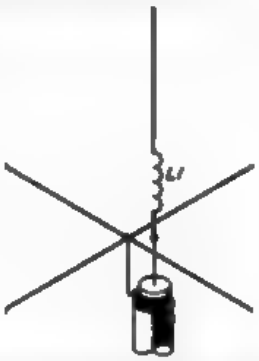


Fig. 2.—⅝ wavelength vertical base-loaded to ¾ wavelength with series inductance.

Since the 5/8 wavelength antenna is non-resonant, it presents highly reactive load impedance unsuitable for direct feeding. At least three basic methods are available to transform this impedance to a 50 ohm non-reactive feedpoint.

Probably the simplest method is the use of a small series inductance as shown schematically in Fig. 2. The inductance can be considered as base loading the antenna to 3/4 wavelength (with no change in the radiation pattern). This is a resonant length which will present a feedpoint resistance of approximately 50 ohms, a very close match to RG-8/U or RG-58/U co-axial cable. Adjustments to the loading coil should provide an s.w.r. of less than 1.2:1.

In the groundplane configuration, some additional improvement in s.w.r. can be obtained by dropping the radials. Approximately 30° below the horizontal will be about optimum with a resulting s.w.r. of less than 1.1:1. This configuration has the advantage in simplicity and ease of construction and tuning. It will also be relatively broadbanded when fabricated of materials of adequate strength.

The second feed method utilises a parallel-resonant circuit tuned to the operational frequency with the feedpoint tapped at a low impedance point on the coil, as shown in Fig. 3. This arrangement may be considered as providing high impedance feed to the base of the radiating element and a direct ground connection to minimise ignition noise and provide a degree of lightning protection. Co-axial feedpoint tap adjustments in conjunction with minor tuning changes can provide nearly a 1:1 s.w.r. at the operating frequency.

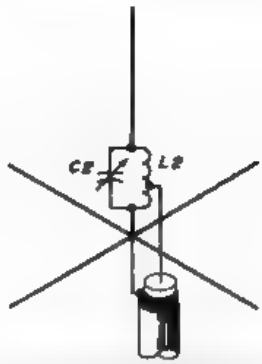


Fig. 3.—⅝ wavelength vertical using parallel tuned circuit feed.

The tap point and tuning adjustment interact slightly and initial adjustments are slightly more time-consuming. However, the coil-capacitor combination can be grid-dipped to the approximate frequency on the bench so that only minor touch-up is required.

This configuration has the additional advantages of providing a very low s.w.r. without decoupling-radial droop or when mounted on a mobile installation. It will not normally be quite as broadbanded as the first.

A third method of feeding is through the familiar gamma match, as shown in Fig. 4. Here the radiator itself is grounded and the feedline is tapped onto the radiator through a series capacitance. This arrangement also provides a direct ground connection for minimisation of ignition noise and a reasonable degree of lightning protection. Feedpoint tap variations combined with series capacitor adjustments can provide nearly a 1.0:1 s.w.r. at the operating frequency.

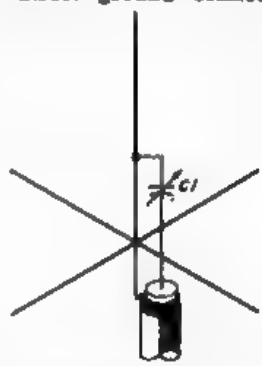


Fig. 4.—⅝ wavelength grounded vertical with gamma match feed.

This configuration is particularly adaptable to feeding existing grounded towers as ground system of heavy radials will be required.

DESIGN

The 5/8 wavelength vertical radiator should be reasonably close to a full 5/8 wavelength at the desired frequency but should preferably be no longer.

(Continued next page)

* Reprinted from "73 Magazine," May 1970.

Consequently, the decoupling radials should be a 5/8 wavelength at the high end of the band of operation. Conversely, the decoupling radials should be a minimum of 1/4 wavelength at the low end of the operating band. The following formulae are based on reasonable velocity factors for materials probably available in Amateur construction and should prove adequate for preliminary design purposes.

Radiator length (inches)
= 7020 ÷ f in MHz., or

Radiator length (feet)
= 585 ÷ f in MHz.

Decoupling radial length (inches)
= 2880 ÷ f in MHz., or

Decoupling radial length (feet)
= 240 ÷ f in MHz.

Using these dimensions, the coupling circuit can then be selected to resonate or provide minimum s.w.r. at the desired operating frequency. Though theoretically any coil or coil-capacitor combination which can be resonated at the desired frequency would work, it is important that good tank-circuit design principles and full weather protection be considered to minimise circuit losses and provide for maximum energy transfer. In general, this implies that all coils be space-wound with large wire or tubing and that length-to-diameter ratios be less than 4:1 (and preferably 2:1). Capacitors should be high quality, ceramic insulated or wide air-spaced variables for ease of circuit adjustment and reasonable power handling capability.

The co-axial feed tap point will vary with different constructional methods and materials, and the optimum point must be determined experimentally for each installation. It will invariably be quite close to the ground end of the coil, varying from approximately 1 turn on 2 metres to possibly 3 or 4 turns on 20 metres.

CONSTRUCTION

While this is not intended as a "hardware" style construction article, a few approaches possibly worthy of further consideration have been accumulated.

Conventional t.v. masting or aluminium tubing is readily available, rugged and inexpensive, although insulation and installation are more difficult than with some other materials.

Of course, the surplus whip antenna segments and their matching insulators are relatively inexpensive, free standing to heights approaching 20 feet; they are relatively light in weight and are available from numerous sources.

Insulated (or even grounded) antenna towers should make effective radiators for the lower frequency bands, providing an adequate ground radial system is incorporated

On 2 metres or even 6 metres, a fibre-glass fishing pole covered with shield braid from RG-8/U and RG-58/U makes an ideal radiator. Of course, 1/8 inch welding rod works adequately on 2 metres or higher bands also.

Although this antenna will probably not complete with a good beam or quad at optimum elevations above ground, it is a very effective antenna, readily and economically fabricated with minimum facilities.

HOME-BREW FIVE-BAND LINEAR AMPLIFIER

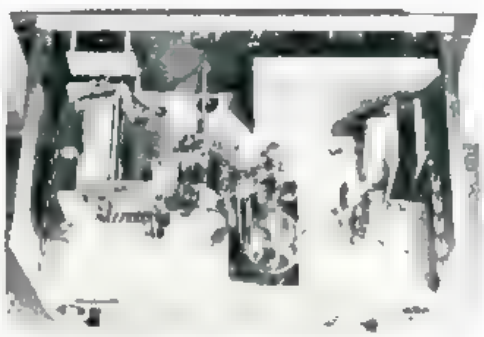
(Continued from Page 9)

ACCESSORIES

The fluted knobs and nickel-silver dial may look old fashioned, but I like them. They're still available commercially. The dial pointer was lost years ago, so I made one from a scrap of plastic. The pinch drive provides just enough drag to keep the tuning capacitor from getting out of adjustment.

The metres, are surplus items. Their sensitivity wasn't what I wanted, but this was corrected using standard techniques.[1]

The roller-coil dial is home-made. I bought a 3-digit counter from a surplus dealer for a dollar. The mitre gears were obtained from a standard right-angle drive. I cut the escutcheon from 1/8 inch thick sheet aluminium. It is finished in black-wrinkle lacquer. A possible source of wrinkle finishes in spray cans is your neighbourhood Speed Shop; the hot-rod set seems to favour these finishes nowadays.



Top view of the Linear Amplifier.

DECALS

You'll want to label your controls and other accessories. I prefer the water-type decals to the dry transfer labels because mistakes are easier to correct. With the latter, you're committed to a position on the panel, and it is difficult to remove dry transfers without ruining the finish. After you have positioned the decals, spray them with clear lacquer.

A FINAL WORD

If this is one of your first major construction projects, and you have made a few mistakes in mechanical work, all is not lost. Most goofs can be remedied. Extra holes can be occupied with screws and solder lugs, as if this is what you intended all along. Or you can strip the finish and fill the hole with auto-body solder, then refinish the panel. This takes a few hours of extra work, but it reflects your pride in a job well done.

1 "The Radio Amateur's Handbook," 46th edition, 1969, American Radio Relay League, p. 528.

FED. PRESIDENT'S TOUR

The Federal President, Michael Owen, VK3KI, has returned from his overseas tour which covered discussion on matters affecting the 1971 Space Frequency Conference, I.A.R.U., and Region III.

Subsequent issues will cover the points of interest to members in his discussions with Amateur Societies in the Far East, U.S.A. and Europe.

The following letter was received from the Secretary of the I.A.R.U. Region I. Division.

Secretary, W.I.A.,

Although writing on I.A.R.U. notepaper, I am also speaking for the R.S.G.B

It is felt by the Council, and particularly by those persons who had the opportunity to meet Michael, that the visit of your President was a most valuable opportunity to discuss many matters of mutual interest. We feel that the W.I.A. are to be congratulated on their foresight in persuading their President to make the arduous journey.

As you know, he had the opportunity of meeting the leader of the U.K. delegation to the Space Conference. As a final development, the Ministry of P. & T. have now given me a brief wording of the proposal to be made at the W.A.R.C. I enclose a copy of this for your information.

Yours sincerely,
R. F. Stevens, G2BVN.

— . . . —

MORSE TAPE SERVICE

There is a Morse Tape Service available to anyone whether a member of the W.I.A. or not from the VK2 Division of the W.I.A. The cost of the service is 30 cents per tape and the loan period is set at two months. There is also a charge of 15 cents for tape overdue beyond the two-month period. Payment of either amount is preferred by either stamps or postal notes made out in favour of the W.I.A. N.S.W. Division.

To save time when applying it would be appreciated if the following information could be supplied in the application:

(1) Name of tape recorder.
(2) Number of tracks.
(3) Maximum size of tape spool used.
(4) Speeds at which it plays
(5) Which tape shown in the list below that you require. It is normal for only one tape to be supplied at a time.

The majority of the tapes available are on 5" spools, two-track at a speed of 3¾ i.p.s. There are also some tapes on 3" spools at 3¾ i.p.s. and 1⅞ i.p.s.

The tapes available from the service are:

Special for beginners (50 minutes)

No. 1:	½ hr.	5	w.p.m.,	½ hr.	6	w.p.m
No. 2:	„	7	„	„	8	„
No. 3:	„	10	„	„	11	„
No. 4:	„	12	„	„	14	„
No. 5:	„	15	„	„	16	„
No. 6:	„	18	„			
No. 7:	„	20	„			

For the supply of tapes or for further information contact the Morse Tape Supervisor, Max Francis, VK2BMK, 93 Kingdon St., Scone, N.S.W., 2337.

READING THE PREDICTION CHARTS

To use these charts, ability to read a graph is the basic requirement. The curve marked M is the maximum useable frequency and in normal propagation, communication by a frequency above the MUF curve is not possible between Canberra and the location shown at the top of the graph. Similarly, the curve marked A is the absorption limiting frequency and frequencies below that line are completely absorbed.

If, for example, the area between the MUF and ALF curve covers 28, 21, 14 and 7 MHz., communication will be possible on all four bands, but signals will become weaker as the frequency decreases and could be below the noise level in a particular area on 7 MHz.

Should the ALF curve cross and become higher in frequency than the MUF curve, then no communication is possible by means of F layer reflection.

Anomalous propagation does occur, but a number of factors can cause this to happen, and at times, prove predictions to be wrong.

To permanently expect to operate at the MUF is "dangerous living" and we use what is known as the optimum working frequency, OWF, which is 15% below the MUF. The F layer never remains constant and varies from day to day, which means if you operate right on the MUF curve you will have times when, due to the MUF falling below the predicted frequency, the band is closed. Similarly, the band could open when not predicted. This is why it is best to use the OWF in working as against the MUF.

To give you an example of reading the chart, I will use the September '70 chart of the long path, Canberra to Montreal.

At 0001 GMT or Z time, the ALF curve passes through 12 MHz., which means as 7 MHz. is below that curve, 7 MHz. is completely absorbed. The MUF curve at the same time is 22 MHz. which means any frequency above 22 MHz. is unuseable, so between the MUF and ALF curve at that time it will show 21 and 14 MHz. to be open.

The MUF curve continuously drops until by 0100z, 21 MHz. has closed, leaving 14 MHz. as the only workable band. At 0530z the MUF curve crosses the 14 MHz. line, which then means 14 MHz. is closed, so that there is no Amateur frequency open to Montreal by long route.

In the meantime the ALF has increased in frequency until at 0700z, it passes through 14 MHz., so even if the MUF curve was above 14 MHz., that band would not be open and this actually does take place at almost 0900z, when the MUF curve goes above 14 MHz. but the ALF curve remains above 14 MHz. until 1500z. So with the MUF curve above and the ALF below 14 MHz., that band will be open at 1500z. However, it again closes at almost 1700z when the MUF curve goes below 14 MHz. and it stays closed until 2300z.

So summing up, 21 MHz. is open 2200z to almost 0100z and 14 MHz. 2100z to 0530z and 1500 to 1700z. If the ALF were to drop 1 MHz. at 2130z, then 7 MHz. would open briefly. Similarly, if the MUF were to rise a little over 1 MHz. at 1100z, then 21 MHz. would have a brief opening.

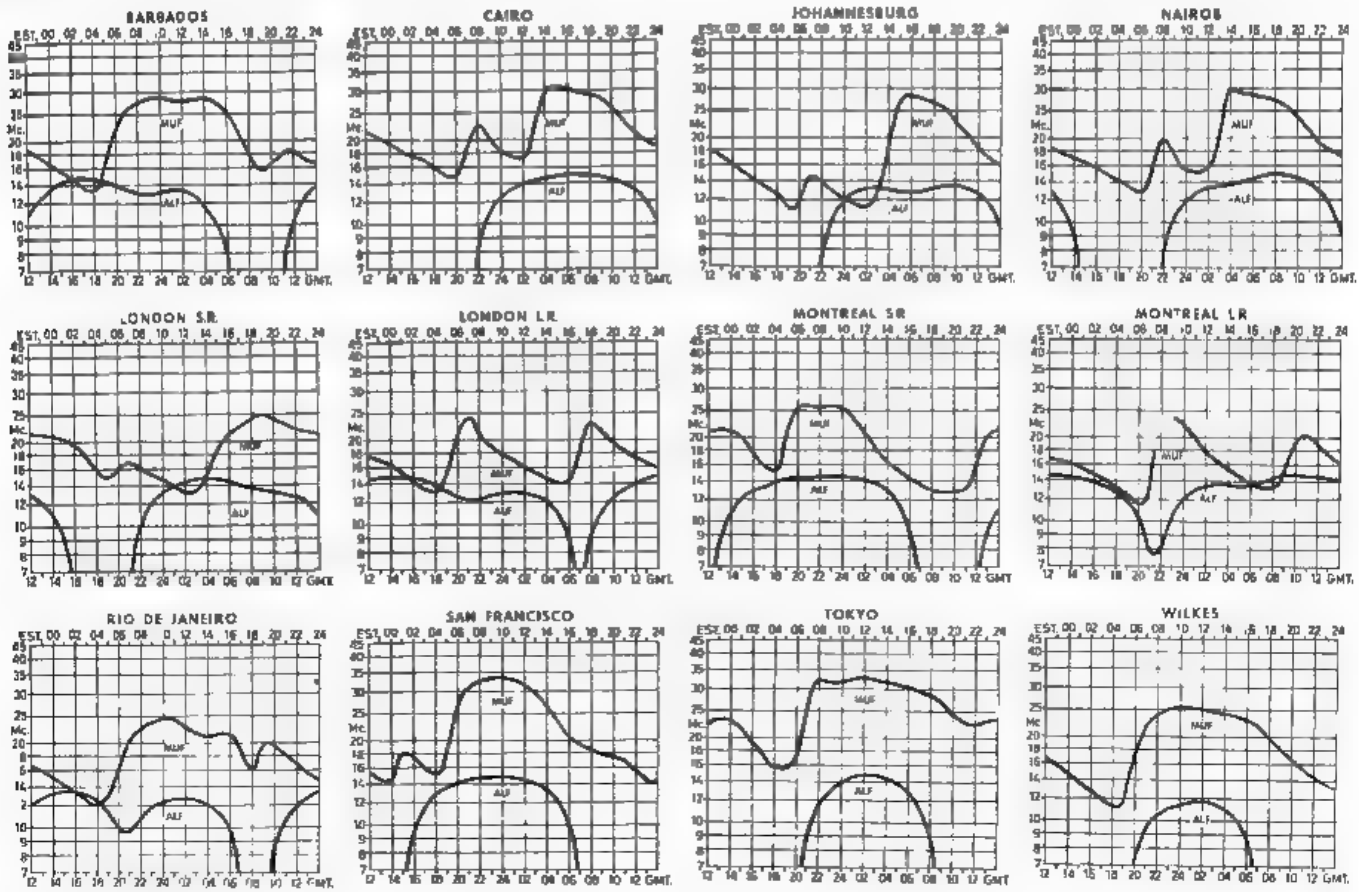
Always remember, the F layer never remains constant, so the MUF can change daily. So can the ALF, but to a far less degree.

If you are able to borrow a copy of "A.R." for January 1967, further information can be obtained from a much more extensive article on this subject.

—F. T. Hine, VK2QL.

PREDICTION CHARTS FOR SEPTEMBER 1970

(Prediction Charts by courtesy of Ionospheric Prediction Service)



Wagga Wagga Centenary and South-West Area Convention

This Convention will be held over the Eight-Hour Week-end **Saturday, 3rd October, Sunday, 4th October;** and **Monday, 5th October.** The location will be in the Wagga City area.

Programme.—Saturday Arrival and registration, tours of city, Centenary Show (Wagga Show Society). Strangers will be met and directed to the registration centre. Net frequencies for Mobiles will be: 40 mx—7110 KHz., 6 mx—52.525 MHz. (FM), 2 mx—146.000 MHz. (FM) all day Saturday.

Saturday night, Dinner to commence at 7 p.m. Slides afterwards for those interested.

Sunday 9 a.m., meet at Bolton Park in Tarcutta St. Guides from there on to site. 10 a.m., welcome and ragchew. 11 a.m., hidden transmitter hunt on 146 MHz. FM. Novelty competitions for YLs, XYLs and Harmonics (scavenger hunts, etc.). 12.30 p.m., Barbecue (big one). 1.30 p.m., varied novelty events for all, events for S.w.l's. 2 p.m., 40 mx all-band scramble, 2 mx all-band scramble (146 MHz.), separate prizes for 40 and 2 mx. 2.30 p.m., pedestrian hunts of varied nature on 2 mx FM for all ranks (146 MHz.). 3.15 p.m., fox hunt on 2 mx FM (146 MHz.) 4.30 p.m., presentation of prizes, results of competitions. 7.30 p.m., auction at hall (10 per cent. for organisation, bring all your unwanteds). Get-together and other entertainment for others.

Monday: 10 a.m., meet at Tarcutta St. again for a visit to varied but interesting organisations in Wagga. To end up at a picnic barbecue, at a take-off point for people to leave from.

Accommodation.—The Wagga District Radio Club has motel accommodation tentatively booked, which can be, under difficulty, held up to the 12th Sept., after that we cannot guarantee accommodation as the Wagga Centenary Show will be on the same week-end. So **please** book early.

Bookings can be made through the Club Secretary, L. A. McKenzie, VK2ZLU, 106 Ashmont Ave., Ashmont, Wagga, 2650. The deposit required is two dollars per person per night. Confirmation will be given by return mail. The motto for accommodation is "be early and all will be right."

WAGGA CENTENARY TROPHY

Radio Amateurs throughout the Commonwealth of Australia are invited to compete for a suitably inscribed trophy donated by the Lord Mayor and the Wagga City Council, as a part of the Wagga Wagga City Celebrations, for the 100 years of local government.

The trophy will be awarded to the station who works the most call signs of Wagga Amateurs, during a period of nine days commencing 12th September, 1970, at 0001 hours A.E.S.T. and finishing 20th September, 1970, at 2359 hours A.E.S.T.

RULES

1. Bands used will be 80, 40 and 20 metres.
2. Modes: AM, SSB or CW.
3. Station who works the highest number of Wagga contacts is declared the winner.
4. Any call sign in Wagga can only be worked once in one 24-hour period (0001-2400).
5. A call sign can be worked in the same 24-hour period on another band.
7. Signal report and contact number is required to be exchanged and recorded in log sheets, e.g. 5900.
8. Log sheets have to be submitted so as to be in the hands of the Secretary of the Wagga District Radio Club by 26th September, 1970. No late entries will be accepted.
9. The winner will be announced at the Wagga Centenary South-West Zone Convention Dinner and also in the N.S.W. Bulletin.

SOUTH-WEST AREA BI-CENTENARY CERTIFICATE

An attractive certificate will be issued by the South West Area to any station who works seven or more stations in the South-West Area (Area 5).

1. The contact can be on any band or any mode.
2. The stations worked can be any part of the South-West Area.
3. Commences on 15th August, 1970, at 0001 hours A.E.S.T. and finishes on 5th October, 1970 (the last day of the Centenary Convention at Wagga).

For those who are not sure, these towns and their environs are in the South West Area:

Wagga Wagga, Albury, Griffith, Narrandera, Leeton, Tumut, Tumbarumba, Batlow, Deniliquin, Temora, and Grong Grong.

4. Show all particulars on the log sheets and submit them to the Secretary of the Wagga District Radio Club, 106 Ashmont Ave., Ashmont, Wagga, 2650.

S.w.l's are invited to submit log sheets for contacts heard, with at least one station in the South-West Area, per contact. Seven contacts are required also.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

GRAPHICAL SYMBOLS FOR USE IN ELECTROTECHNOLOGY—DRAFT STANDARD

The Standards Association of Australia is seeking comment on draft Australian standard graphical symbols for use in electrotechnology, applying in particular to semiconductor devices. The draft is issued for public review as Doc. 1579.

The draft is based on an International Electrotechnical Commission recommendation for symbols, and the terminology is consistent with the International Electrotechnical Vocabulary. This will facilitate the exchange of information on equipment using semiconductor devices.

Doc. 1579 applies to graphical symbols for use in circuit diagrams. It establishes a number of basic elements and demonstrates a method of combining these elements to produce complete devices. Symbols may be combined to produce more complex or more descriptive symbols, or both. The principles governing the combining of these various symbols are specified.

Qualifying symbols indicating a special function or property essential for operation of the circuit containing the device are defined and examples given of their use. Reference designations are shown for discrete devices.

Copies of Doc. 1579 may be obtained, without charge, from the various offices of the Standards Association of Australia in all capital cities and Newcastle.

Comment on the provisions of the draft is invited from persons or organisations experienced in the application of such symbols in their field of work. Such comment should reach the head office of the Association, 80 Arthur St., North Sydney, N.S.W., 2060, or any branch office, not later than 30th September, 1970.

WORKED ALL VK CALL AREAS (W.A.V.K.C.A.) AWARD

OBJECTS

1.1 This Award, to be known as the W.A.V.K.C.A. Award, is offered by the Wireless Institute of Australia as tangible evidence of the proficiency of overseas Amateurs in making contacts with the various call areas of the Commonwealth of Australia.

1.2 The Award may be claimed by any Amateur in the world who is a member of an affiliated Society of the I.A.R.U., but no Australian Amateur will be eligible.

REQUIREMENTS

2.1 A handsome Certificate will be awarded to any applicant who makes contacts with Australian Amateur Stations in the areas shown in the attached Appendix. The number of contacts required in each area is also shown.

OPERATION

3.1 Contacts between overseas stations and Australian stations must have been made on or after the 1st January, 1946.

3.2 Contacts may be made using any authorised frequency band or type of emission permitted to Australian Amateurs, but cross band contacts will not be allowed.

3.3 No contacts made with ship or aircraft stations in Australian territories will be eligible, but land-mobile or portable stations may be contacted provided the location at the time of contact is shown on the confirmation.

VERIFICATIONS

4.1 The applicant must submit documentary proof, in the form of QSL cards or other written evidence, confirming that two-way contacts have taken place. Such verifications must show the date and time of contact, type of emission and frequency used, signal reports and location (in the case of portable or land-mobile operation) of the stations contacted.

4.2 Verifications must be submitted exactly as received, and forged or altered evidence may result in the disqualification of the station concerned.

4.3 A list, in accordance with the details required in Rule 4.1, must be submitted with the application for the Award.

APPLICATIONS

5.1 All claims for the W.A.V.K.C.A. Award must be made by the submission of the confirmations (Rule 3.1), together with the list (Rule 4.3), direct to "Awards Manager," P.O. Box 67, East Melbourne, Victoria, 3002, Australia. Sufficient International Reply Coupons must be enclosed to cover return postage of the confirmations to the applicant.

5.2 Where a reciprocal agreement exists between the W.I.A. and the applicant's Society, the appointed officer of that Society will carry out the check, and if correct, will forward a written application for the Award on behalf of the applicant, together with the list (Rule 4.3).

5.3 Applications will be examined by the Awards Manager, who will arrange for the Award to be forwarded either direct or through the applicant's Society. The Awards Manager's decision on the application and interpretation of these Rules will be final and binding.

5.4 Notwithstanding anything in the Rules to the contrary, the Federal Council of the W.I.A. reserves the right to amend these Rules as necessary.

APPENDIX

Territory	Call Area	QSLs Required
Australian Antarctica, Heard Island, Macquarie Island	VK0	1
Australian Capital Territory	VK1	1
Lord Howe Island, State of New South Wales	VK2	3
State of Victoria	VK3	3
State of Queensland, Thursday Island, Willis Island	VK4	3
State of South Australia	VK5	3
State of Western Australia	VK6	3
Flinders Island, King Island, State of Tasmania	VK7	3
Northern Territory	VK8	1
Admiralty Islands, Bougainville Island, Christmas Island, Cocos Islands, Nauru (VK9 only), New Guinea, New Ireland, Norfolk Island, Papua Territory	VK9	1

Note.—In Areas above, where more than one confirmation is required, contacts may be made with any or all of the Territories listed in brackets.

NEW CALL SIGNS

APRIL 1970

VK2GE—M. G. Datson, 75 Terry Rd., Eastwood, 2122.

VK2ABL—W. A. Easterling, 279 Forest Rd., Kirrawee, 2232.

VK2ALM—V. J. McKerchar, 42 Alanas Ave., Dundas, 2117.

VK2BAY—J. A. Bowgen, 31 Oakland Ave., Windang, 2508.

VK2BJH—G. J. Griffiths, Station Bellimbopini, via Kempsey; Postal: 21 Neville Everson St., Kempsey, 2440.

VK2ZJH—G. J. Merrill, 6 Bungowen Ave., Thornleigh 2120.

VK2ZVJ—J. E. Brown-Sarre, Silver City H'way, Buronga. 2648.

VK3FP—C. Reisinger, 69 Noble St., Noble Park, 3174.

VK3UO—J. C. Chappendall, 29 Waverley Pde., Pascoe Vale, 3044.

VK3AEF—J. M. Bywaters, 30 Queen St., Nhill 3418.

VK3AHO—W. R. Hempel, 9 James St., Kyabram. 3620.

VK3AKI—K. H. King, 18 Stonehaven Cres., Moorabbin, 3189.

VK3BBY Shepparton South Technical School Radio Club, Wilmot Rd., Shepparton, 3630.

VK3BCG—Camberwell Grammar Radio and Electronics Club, 55 Mont Albert Rd., Canterbury, 3126.

VK3BCP—R. M. Trott, 137 Bignell Rd., East Bentleigh, 3165.

VK3BCT—R. D. Trickett, 8 Yinnar St., Broadmeadows, 3047.

VK3BCY W. H. M. Hoyle, 45 Turana St., Doncaster, 3108.

VK3BDG—D. R. Garratt, 30 McGregor St., Fairfield 3078.

VK3BDL—A. M. Goode, 92 Mont Albert Rd., Canterbury 3126.

VK3BDS—R. H. Wills, 3 Westbourne Gr., Camberwell, 3124.

VK3BDV—H. J. Hook, 145 Miller St., North Fitzroy, 3068.

VK3BGB—W. G. Baird, 23 Landale St., Box Hill 3128.

VK3YAO—G. N. Payne, Flat 10, 85 Cleeland St. Dandenong. 3175.

VK3YBI—H. N. Ronchetti, 4 Finlayson Cres., Traralgon 3844.

VK3YCI R. J. Whitmore 65 Doncaster Rd., Mitcham, 3132.

VK3YCL—J. E. S. Day, 35 Mount St., Glen Waverley, 3150.

VK3YCM—B. F. Sunderland, 3 Grafton St., Coburg, 3058.

VK3YDA—A. J. Conrad, 8 Allambee Ave., Camberwell, 3124.

VK3YDB—G. N. Long, Eyre Rd., Mt. Dandenong, 3788.

VK3YDC—R. J. Paynting, Flat 10, 39 Somerset St., Richmond, 3121.

VK3YDM—M. J. Dawkins, 74 Springvale Rd., Nunawading, 3131.

VK3YDS—G. J. Payne, 97 Ringwood St., Ringwood, 3134.

VK3YDX—C. Pandolfo, 35 Clifton St., Richmond, 3121.

VK3YEF—M. R. Hammer, 285 Bay Rd., Cheltenham, 3192.

VK3ZHX—H. E. Jones, 3 Laird St., Croydon, 3136.

VK3ZRL—R. W. Nash, Gleneuse St., Point Lonsdale, 3225.

VK3ZTI—P. D. McKenzie, 10 Homer Ave., Croydon, 3136.

VK4CS—J. McDonald, Flat 1, Tallaringa, 8 James St., Currumbin Beach, 4223.

VK4DT—J. H. Ginsberg, Eton Private Hotel, Adelaide and Wharf Sts., Brisbane, 4000.

VK4LQ—J. L. Jones, 24 Leslie St., Toowoomba, 4350.

VK4LY—L. A. Dancey, 8 Warren Crt., Aitkenvale, 4814.

VK5AZ—B. T. Parker, 10 Regent St., Pennington, 5013.

VK5LL—L. G. Douglas, 123 Flinders Tce., Port Augusta, 5700.

VK5PK—P. Kwart, 5 The Grove, Dulwich, 5065.

VK5SI—W. O. B. Wilson, C/o. R. Sedunary Campbell Ave., Crafers, 5152.

VK5ZES—E. L. Smith, Flat 2, 11 Hawson Pl., Port Lincoln, 5606.

VK5ZHE—H. Ditlioff, 22 Parkmore Ave., Sturt, 5047.

VK5ZRF A. R. Holker, 80 Mainwaring Cres., Elizabeth Field, 5113.

VK5ZZI—D. W. Friend, 84 Northgate St., Unley Park, 5061.

VK6CK—C. M. Hayes, 42 Brentwood Ave., Woodlands, 6018.

VK6RW—R. J. Watson, Station Mingenew, 6522, Postal: C/o. Casuarina Enterprises Pty. Ltd., P.O. Box 67, Mingenew, 6522.

VK6SR—Southern Electronics Group, Blue Waters, The Esplanade, Little Grove, Albany, 6330.

VK6ZAQ—A. M. Gath, Station: Cuballing, 6311; Postal, P.O. Box 29, Cuballing, 6311.

VK6ZAY—C. F. Muller, 128 Gladstone Rd., Rivervale, 6103.

VK6ZGN—R. E. Good, 237 Gloucester St. Victoria Park, 6100.

VK6ZGV—M. B. Harris, 4 Hough Rd., Attadale, 6156.

VK6ZGX—J. A. Cunningham, 18 Boronia Cres., City Beach, 6015.

VK7LH—L. R. Hiller, 143 Gunn St., Devonport, 7310.

VK7MK—Kings Meadows High School Radio Club, Guy St., Launceston, 7250.

VK8KN—R. W. H. B. Jones, Station: Portable; Postal: 14 Brown St., Alice Springs, 5750.

VK8ZQ—R. J. Sieber, 28 Lindsay Ave., Alice Springs, 5750.

VK9JG—R. J. Gray, Boundary Rd., Lae, N.G.

VK9JJ—J. J. Schafer (Rev.), Station: Bundralis Manus Island, Postal, Catholic Mission, Bundralis P.O., Lorengau, Manus Island.

CANCELLATIONS

VK1BX—M. C. Hooper. Transferred to Vic.

VK2AXQ—Kiama High School Radio Club. Not renewed.

VK2BCG—A. Cruickshank. Not renewed.

VK2BJJ J. P. Meehan. Not renewed.

VK2BPH—P. Halpin. Not renewed.

VK2BRW W. R. Beveridge. Not renewed.

VK3CH—A. G. Nunn. Not renewed.

VK3VU—J. C. Chippindall. Now VK3UO.

VK3AEF—Eighth Footscray Boy Scouts' Amateur Radio Club. Not renewed.

VK3AEM—H. E. Michel. Now VK3JX.

VK3AYK K. F. Price. Not renewed.

VK3BKK K. H. King. Now VK3AKI.

VK3ZAK—A. Kay Kravchenko. Not renewed.

VK3ZCJ G. G. Baker Transferred to N.T.

VK3ZOD—G. N. Payne Now VK3YAO.

VK3ZRR—C. Reisinger Now VK3FP.

VK3ZUK—B. R. Freer Not renewed.

VK3ZXR—J. E. Rising. Not renewed.

VK3ZYY—A. M. Goode Now VK3BDL.

VK4WG—W. G. G. Clayton. Not renewed.

VK5DQ—K. J. Horan Transferred to Vic.

VK5ZKO—B. T. Parker Now VK5AZ.

VK5ZLL—L. G. Douglas. Now VK5LL.

VK6ZAT—B. J. Jacobs. Not renewed.

VK8ZCE—R. J. Sieber Now VK8ZQ.

Overseas Magazine Review

Compiled by Syd Clark, VK3ASC

"BREAK-IN"

June 1970—

Digital Frequency Counter, ZL2BGP, Part I. This article describes the theory of operation of frequency counters and describes the construction of a unit suited to Amateur uses which is composed almost entirely of integrated circuits.

Did You Get That Country Confirmed, ZM-2AFZ. For those people who send more cards than they receive.

A ZL in JA, ZM2CD. Describes the experiences of the N.Z.A.R.T President in Japan.

Single Sideband Exciter 9 MHz. Phasing Type, ZL4LV. Part 2. Continues the description of this equipment. Circuits, parts lists, board layouts, etc.

Decibels, ZL2NK. Many newcomers to Electronics find it hard to understand Bels and Decibels. Mr. K. G. Johnson explains.

"CQ T.V."

May 1970—

Published by the British Amateur Television Club.

A Modern Vision Mixer, by G8ARV and G8SDB/T.

Notebook No. 4, An IC Timing Generator for Slow Scan.

How to Make Yourself a Cheap and Cheerful Delay Line, G8SDB/T and G8ARV. Australian Amateurs interested in t.v. experiments may wish to become members of the B.A.T.C., 84 Showell Lane, Penn, Wolverhampton, Staffs, England.

"OHM" The Oriental Ham Magazine

April 1970—

As a rule this publication does not seek to outdo "QST," "CQ," "73," or other U.S. magazines in technical content, in fact there are often no technical articles at all. It is published in Hong Kong. (The writer has visited Hong Kong twice during 1968 for about an hour each time and can only describe the landing of the aircraft at Kai Tak as "Breathtaking . . . those hills appear to be very close to the wing tips!) The publishers of "Ohm" can usually be relied upon for some interesting news from their area and this month "**Return to Corregidor**" is described. Students of history will remember that the last stand of the American Far Eastern Forces was made at Corregidor in 1942 and that General Douglas Macarthur escaped to Australia by P.T. boat and strongly influenced the conduct of the war against the Japanese.

"QST"

June 1970—

A Digital Morse Code Message Generator, K1PLP. Described by the author as a c.w. identifier or contest "2nd op." Push a button and the box automatically sends CQ plus your call, plus the standby K, in absolutely perfect code. Or it can be set up to send a complete contest exchange or for a repeater identifier. Cost, in the U.S.A., less than $55.

Building a Simple Two-Band V.F.O., W1CER. Describes in a follow-up article to the v.f.o. design article that appeared in last month's "QST," a solid state v.f.o. for 3.5 or 7 MHz.

How to Handle Hi-Fi Interference, W1ICP. New problems take the place of old and as "hi-fi" equipment spreads across the countryside more and more Amateurs can expect to receive complaints from neighbours who have purchased expensive audio equipment. There is no single solution to the problem and some of the techniques for curing interference are described.

The Portable/Mobile Microphone, W1KLK. This article reviews the basics of microphones, contains information on adapting military surplus noise-cancelling microphones for Amateur use and shows how to construct carbon and magnetic hand-held mikes from inexpensive telephone elements.

Let's Talk Transistors, Part 8, Odds and Ends. A closer look at power dissipation, leakage current and current amplification.

A 10-6 Mobile Whip, WA2HMM. By using a shunt circuit resonant circuit at the top of the six metre element it is effectively isolated from the ten metre section during six metre operation. A similar technique can be used on other bands if desired, mechanical problems will be a little harder.

V.h.f. Mobile Whips, W1HDQ. Take some PL259 plugs, some transistor radio or car radio whips and a few odds and ends and your new mobile antenna can soon be completed.

Slow Scan T.V. Viewing Adapter for Oscilloscopes, W7FEN. This article describes a simple adaptor to convert popular oscilloscopes to slow scan monitors.

A Bonus to the Public, W3KMV/W4GKM. Statements that our hobby must operate in the public interest to justify its existence are not new to Amateurs. We've been providing public service communications, keeping technically alert and contributing towards advances for many years.

Field Day Verticals Versus Yagis, W6ISQ. A humourous article with some pros and cons of one of the old arguments.

"RADIO ZS"

April 1970—

A Versatile Monitor, ZS1MM. A useful gadget for measuring field strength or indicating when a transmitter is on air by means of a moving coil meter.

Introduction to and Theory of Hall Effect, ZS5D. This effect was discovered by E. H. Hall at John Hopkins University in the U.S.A. in 1879. Due to the lack of suitable materials from which to obtain useable voltages, its application had to await the development of suitable semiconductor materials for it to gain wide acceptance in scientific circles. It is mostly used for the measurement of magnetic fields.

Simple Half Power Circuit, ZS5HF. Place a silicon diode across a single pole switch in series with your resistive load and the r.m.s. power is halved when the switch is open. Very useful for maintaining a soldering iron hot without overheating.

What About the Receiver, ZS5D. A humorous story about receiver ailments and particularly about Miller Effect.

Simple "No Holes" Mobile Mount, VK3ASC. Reprinted from "A.R."

New Approach to Multi-band Beam Design, G2HCG. Reprint from "S.W. Mag."

These Good Old Days, ZS5JC. Spark bit (not transistorised).

The Bag Bites a Nautical Type, ZS1002. One for the S.w.l's.

May 1970—

C.B.C.—What Does It Stand For, ZS1ACD/CHC201. The Certificate Hunters' Club members will already know all about it.

The L.V.S. Power Supply, ZS5HF. The author claims that a power supply for an s.s.b. rig requiring say 300 mA. peak can be built from a transformer capable of about 25 per cent. of that power, i.e. 75 mA. continuous. If the same power supply is to be used for a transceiver it may need to be rated a little more liberally and if you want to use it for something like r.t.t.y. then the power supply will need a continuous rating which is much nearer unity.

Loading Made Easy, ZS6ACK. Describes methods of making it easy to properly load a transmitter. Certain simple tuning aids are described.

How I Became a Ham, ZS5FD. Different people are introduced to the hobby in different ways. Being hooked on Ham Radio is like some of the other drugs about, only much less dangerous.

"THE AUSTRALIAN E.E.B.

Apparently certain incorrect information was published in a recent issue of "A.R." and we have been asked by Dr R. L. Gunther, VK7RG, to publish the following statement:

Unfortunately there was a slight mis-print in the recent Review in "A.R." Since January 1970 our three-year subscription rate has been $3.90 (plus 5c if by cheque). Since our subscription rate just barely covers costs (not including promotion!), it could hardly be possible for us to offer a 33 per cent. discount for a three-year subscription.

"THE INDIAN RADIO AMATEUR"

February 1970—

IC Keyer, VU2JN. Detailed information is given to enable the construction of an IC keyer in a small metal or plastic box. The paddle is not described.

Practically all of the balance of this issue is devoted to matters discussed at the XIIth Plenary Assembly of the International Radio Consultative Committee (C.C.I.R.). A meeting at New Delhi and which commenced on Wednesday, 21st January, 1970.

"73" Magazine

June 1970—

A Practical DDRR Antenna, W6WYQ. Expensive, difficult to build, mediocre antenna.

V.F.O. Circuit, K0HVK. In case you are tired of crystal control.

The Low Noise Antenna, WB6JNI. High noise you're looking for?

Experimental Remote S.W.R. Indicator, by W2EEY. Experimental means we think it might work.

The Little Wonder, Mark II., W5ZBC. Proving again that almost anything will radiate.

C.W. Can Be Fun (with the Ord DK-1), Staff. If you know the code.

Two Receivers From One Antenna, WA6UFW. Without suckout.

Factors in Co-axial Cable Loss, W6KXJ. Like temperature and frequency.

Improving Trap Vertical Antennas, W1BBY. By adding an element.

Measuring Incident and Reflected R.F., VE-7BS. It's the difference that counts.

Government Surplus, Straight from the Horse's Mouth, WA8ANW. Hay, hay!

QRP, WA3JBN. 40 metre with 40 mW.

Ground Support for the Powder Puff Derby, W7ZC. Public service and politicians.

Co-ax. Adapter V.H.F. to B.N.C., W6MEV. For 75c.

The Sly Beam, ZL4TAH. 22 elements on 2 metres. (Has been published in "Break-In".)

Three Unrelated Articles, WA6CPP. Installing the Swan 250-C Noise Silencer, Measuring R.F. Output, Useful Cable Clamps.

Quarter Wave Top Loaded Mobile Antenna, W6AZE. For twenty metres.

11 Element Two Metre Circular Quad, by W4KAE. 9 dB. forward gain.

The 823, ZL3ASJ. For 10, 15 and 20 metres. (Published previously in "Break-In".)

"73" Tests the Grundig Satellite Receiver, Staff. Tunes in c.w., s.s.b., f.m., etc.

De-R.F. Your V.T.V.M., WA0FFJ. Works better.

Getting Your Extra Class Licence, Staff, Part XVII. Conclusion. Now go.

"73" SPECIAL, CO-AX. HANDBOOK

Part 1.—Co-axial Cables. The different kinds of cables, their properties, and why they are made that way.

Part 2.—Co-axial Connectors. A fantastically large variety of connectors are organised into useable lists. Descriptions, drawings and assembly instructions.

Part 3.—Co-axial Accessories. Descriptions of switches, S.W.R. bridges, attenuators, dummy loads, etc. Very complete.

Part 4.—Co-axial applications. Frosting on the cake.

A reasonably comprehensive survey of types of cable and fittings which can be expected to interest the Radio Amateur. Unfortunately the publishers did not see fit to include information of types of cables and fittings developed in Britain or on the continent of Europe. Nor do they acknowledge that Andrew and Phelps Dodge use European patents and processes in the manufacture of their products.

VHF

Sub-Editor ERIC JAMIESON, VK5LP
Forreston, South Australia, 5233.

Closing date for copy 30th of month.
All Times in E.S.T.

AMATEUR BAND BEACONS

VK4	144.380	VK4VV, 107m. W. of Brisbane.
VK5	53.000	VK5VF Mt. Lofty
	144.800	VK5VF Mt. Lofty
VK6	52.006	VK6VF, Tuart Hill.
	52.900	VK6TS, Carnarvon.
	144.500	VK6VE, Mt. Barker
	145.000	VK6VF, Tuart Hill.
	435.000	VK6VF (on by arrangement).
VK7	144.900	VK7VF, Devonport.
ZL3	145.000	ZL3VHF, Christchurch.
JA	51.995	JA1IGY, Japan.
W	50.091	WB6KAP, U.S.A.

The contact between Doug VK4KK and VS6DA recently has caused quite a number to look back through log books, bringing back memories of the tremendous openings of 1968 and 1969. A note from Lance VK4ZAZ in Rockhampton advises the other Hong Kong station mentioned, VS6CJ, was worked mostly by Townsville stations, but heard by Lance and Bob VK4NG, and worked by VK4ZBE. However, all who have mentioned prior workings add their congratulations to Doug for his effort. Lance also advises receiving a card from KX6HK, who was receiving him 5 x 8 in April, but was mostly drowned out by JA transceivers and a 2-way contact was not quite made. However, he will be on again next autumn looking for VK signals, running 70 watts, mostly c.w., and working in our part of the band. KX6AF was worked in VK4 in 1958, so this is not a new one, but mighty good to have nevertheless! Thanks for the news Lance.

Passing now into the Eastern Zone of Victoria, I am indebted to George AX3ASV for a short note of activity there, where quite a bit of emphasis is being placed on Amateur t.v. construction. The minor winter Es solarise season gave the Zone one opening to AX4 on 11th July when AX4ZZE was worked by AX3YBD, AX3YAT and AX3ASV on 53.032 MHz. The opening lasted for only three quarters of an hour around 1600, so the old adage "You've got to be operating to work them" still applies! The Zone net on the above frequency beams west every Sunday morning.

The VK3 V.h.f. Group will conduct their Annual V.h.f. Field Day on Sunday, 27th September, there being two periods of operation, 0730 to 1130 and 1330 to 1630. The same stations may be contacted during the second period as may have been contacted in the first. Scoring will be between portable to portable, or portable to fixed. Crossband operation is permitted, and contacts across the border to VK3 or any other States will be welcomed. The winners of the last two Field Days, Bob VK5ZDX and Wally VK5ZWW have again issued a challenge to all comers, and it appears the gloves have been accepted in one or two quarters, so the Field Day may be very interesting.

I do note with great interest that the first Field Day for the season in VK3 will be run on the same day as the VK5 Field Day, namely, Sunday, 27th September, but between the hours of 1100 and 1600. So the second section of the VK5 operations will coincide with the VK3 operation. Maybe some of the interested VK3s will be available to test their equipment early in the morning on 144 or 432 MHz., and give the VK5s that added incentive to look across the border. The second VK3 Field Day will be on Sunday, 1st November.

A letter from Bob AX3AOT advises the above information, and he mentions quite a lot of work is being devoted to preparations for the forthcoming VK3 V.h.f. Convention on 10th and 11th October, when it is anticipated equipment will be on display for all bands from 52 MHz to 2300 MHz. I note amongst other things in the varied programme that there will be a 144 MHz. transmitter efficiency contest (getting those portable transmitters ready for the Field Day?), a 432 MHz. antenna gain contest, and a novel one for the ladies, a "radio throwing contest". I have one here in the district I regularly repair which I would be glad to give to someone to throw!!

Bob further reports activity near him is slack at the moment, accentuated by quite a lot of constructional activity, in which he is indulging himself, even to including 576 MHz. From the "grapevine news" Bob passes on, it certainly will pay us in VK5 to do some mountain topping over the Christmas holiday period, it could be very interesting indeed!

Thanks to the Geelong Amateur Radio-T.v. Club for another copy of their Newsletter. They are certainly an active body, meeting every Friday night at the Club Rooms, Storrer St., East Geelong. Their programme committee must surely be hard pressed at times to come up with something fresh in the way of lectures, etc. I note the Club is going ahead with the construction of the second stage of the additional Club room. I note the inclusion in the current issue of their Technical Topics No. 14, dealing with four types of vertical antennas, one with an omni-directional pattern gain of about 6.5 db., and another with a forward gain of 9 db.

A comparatively new area for permanent contacts has recently been opened up by the transfer to Port Lincoln on the west coast of S.A. of Peter VK5ZPG, who operates on 144.600 using a 5 element beam about 30 feet high at present and who can be worked even through the daylight hours in Adelaide with signals to 59, a distance of about 150 miles. If you refer to your maps you will see Port Lincoln is mostly a water path to Mt. Gambier and Warrnambool, should be pretty good even to Geelong, and real good to VK7. Peter is keen, so it's up to you chaps who live in the good path direction.

Colin VK5ZKR in Mt. Gambier reports everything quiet down there while the majority of the Limited licence population study hard for the Morse examination in August. We wish them well, and hope that when they have passed, they will add c.w. facilities to their v.h.f. equipment, rather than turn it aside for h.f. operating only! 432 MHz. looks like a lively band in Mt. Gambier this summer with David VK5ZOO, Trevor VK5ZTN, Dale VK5ZER, Colin VK5ZKR and Chris VK5ZFA all operational. Chris has gone a step further and is using v.f.o. control on 432 MHz. s.s.b. with a QQE06/40 mixer, other stages to come later!

The S.A. V.h.f. Group station AX5AWI, has certainly been getting around a bit, and making itself known. It was taken down to the S.E.R.G. Convention at Mt. Gambier in June and then at the end of July operated in the VK5 Intrastate Contest, fielding transmitters and receivers on all bands between 160 metres and 432 MHz. inclusive, from the QTH of Wally VK5ZWW, in a shack 6 feet square and three operators.! It should again be operating in the VK5 Field Day on 27th September. The station was first licensed as VK5ZWI, but the Group felt this call rather restricted its activities, hence the later application for a change.

As news this month is a bit scarce due to the usual winter activity, it is probably of interest to pass on to you something most will not remember. Reading through an October 1947 "QST" recently, I noted that the first 50 MHz. contact between Australia and the Hawaiian Islands took place on 27th August that year between Clarence VK5KL at Darwin and W7ACS/KH6 Pearl Harbour. This contact also set a new record for the 50 MHz. band, taking the distance to 5,350 miles. VK5KL used a co-axial fed three element beam, running 100 watts to a pair of 834s. In the same issue was word of a new home station record for 144 MHz. working, between VE1QZ and W1OSQ for a distance of 520 miles. Distances have certainly lengthened since those days, but you will note the period was the maxima, or thereabouts, of the sunspot cycle two cycles ago.

That's it for this time. I will feature "Meet the Other Man" when I eventually get some replies from those to whom I have written. Thought for the month. "Despite jets, missiles and such, nothing goes faster than a two-week holiday." Till next month, 73. Eric VK5LP, The Voice in the Hills.

SIX METRE TESTS FROM GREENLAND

Amateurs using the 50 MHz. band are asked to look for OX5AP, Thule, Greenland, who is making five-minute transmissions on the hour, from 2200 to 0200 GMT daily. These transmissions are on 50.15 MHz. and will continue through this year, except for the period of 5th August to 14th August. He will listen for 6 metre signals in the five minutes after each test. OX5AP is available for 14 MHz. schedules between 2100 and 1100 GMT. Please report any reception or two-way communication on 50 MHz. band to the A.R.R.L.

(Official Bulletin No. 361 from A.R.R.L. Hdq., July 16, 1970, to all Radio Amateurs.)

W.I.A. D.X.C.C.
(S.W.L.)

Listed below are details relating to those Australian Short Wave Listeners to whom this certificate has been awarded —

Cert. No.	Call	Name	DATE Awarded
1	L3042	Eric Trebilcock	1/11/65
2	L3032	Don Grantley	29/12/65
3	L3211	Warwick Smith	31/5/66
4	L4018	Chas. Thorpe	11/7/66
5	L3080	Ernie Luff	25/1/67
6	L3229	Bob Halligan	18/11/67
7	L4031	Peter Drew	31/1/68
8	L3283	Bob MacIntosh	19/4/69
9	L3088	Steve Reudiger	7/8/69
10	L3165	Brian Hannan	27/8/69
11	L3312	Maurice Batt	5/12/69
12	L3300	Bob Hanel	30/6/70

—Eric Trebilcock,
S.w.l. Awards Mgr., W.I.A.

FREQUENCIES OF VK6WI

VK6WI broadcasts can be heard at 9.30 a.m. W.A.S.T. on Sundays on the following frequencies:

3.600	MHz.—SSB
7.082	MHz.—AM
14.1	MHz.—SSB
52.4	MHz.—AM
52.656	MHz.—FM
144.26	MHz.—AM

DX

Sub-Editor: DON GRANTLEY
P.O. Box 222, Penrith, N.S.W., 2750
(All times in GMT)

Here in N.S.W. we are experiencing some of the best weather we have had for months, no rain, and nice fine days have no doubt contributed to the large number of VK2 stations on the bands working DX. There is plenty to work these days, regardless of the band selected. I note several good openings on all bands from ten metres right down to 80, and have heard reports of some good openings on ten very early in the morning.

Still the best by far is 20 metres, with many of the rare ones being heard at this QTH, particularly in the evenings. Late afternoon and early morning have shown some good openings on 40 metres, with prefixes such as FJ, FO7, CT2, EA9, FY0, TR8, VP2, KW6, 9V1, CR6 and many others being heard and worked.

George ZL3AFZ passes on some interesting notes re activity on 80 metres by ZM1FZ and F9OL. I could do no better than to quote George's notes, which will appear in "Break-In" at the same time as you read this. "It has been generally accepted that the DX season on 80 finishes for the season which is normally 1st Sept., through to 30th Mar., for both c.w. and s.s.b. Athol ZM3FZ has been in QSO with Jean F9OL for weeks prior to 30th March and they still continue to QSO each day at 0445z, through to the shortest day here (ZL). The object now is to continue through the supposedly dead season. The frequency used is 3502, and reports so far are 449 both ways. Athol watches closely on 80 and reports that when we have a deep red sunset here (ZL that is, his signals peak in many tests. Athol would be pleased to hear from anyone with similar interests in respect to 80 metres."

Roy ZM1AAT/K is still active from the Kermadecs, and is anxious to make as many contacts as possible before he returns to ZL. He will be pleased to sked anyone and George ZM3AFZ will be pleased to pass any requests on during his daily log exchange.

George, as you know, handles the QSL chores for Harold AX0LD and says that there may be some delays in clearing the QSLs for, although they have many skeds, propagation conditions are such that conditions deteriorate so quickly that no really effective clearance of logs can be made at times.

I was pleased to receive a note plus bulletin from Stew W1BB who is hale and hearty after a long spell in hospital. Stew reports a first ever contact on 160 metres between K5TFG in Louisiana and EI8J, HB9CM and G2FL back on 21st March. Then W4BRB trotted off to VP7, where he had 187 contacts on 160; these included GM, G, EI, PJ, KV4, HR3, VE, W and VP2. Stew says that activity in the States on 160 has increased to the point where there is talk of the A.R.R.L. running a separate contest for that band. On the other side of the Atlantic, the G land stations report the best season ever.

Operation from ZK1, ZK3 and ZM7, Manihiki, Niue, and Tokelaus respectively, should be well under way. Two rigs supplied by K5RLY and WA5REU were in Auckland at the beginning of July with a possible start about 10th July. They will be moving about quite a bit, so it is suggested that it may be advisable to keep a lookout on the Pacific area whenever possible. Details even at this late date, 21st July, are a little sketchy, however those involved are ZL1AJ, ZK1MN, ZK3AF and 5W1AR.

Another completed operation with very conflicting reports was the OH2BH/ZA operation on Friday, 10th July. They did operate from Albania for 12 hours, after which their rig was taken away. According to the very reliable Geoff Watts DX News Sheet, their gear was returned on 17th July and they left Albania with documented proof of their operation for the A.R.R.L. It is understood that they may operate from there again provided that sufficient notice is given. If you were one of the fortunate 700 contacts, then send your QSL to OH2BH.

Not so assuring are the reports of the ZA1C operation on 5th. July. This one came on with the proverbial great song and dance and many QSOs were made. But despite all the fuss, there is no evidence that this was a legitimate operation, and until proof is forthcoming, it must be treated phoney, or a well planned hoax.

Details are being worked out in New Delhi by Larry K2DXP, for operation by VU2DXP from the Laccadives. There are some points to be worked out, but this one could crop up any time between now and September.

Bouvet Is., under its new prefix 3Y, is due for three months operation from October by ZS6ANT. Watch your DX news bulletins for further information on this one.

There are several operations in the planning stages, none of these are guaranteed to occur, but they are very strong possibilities. CE0 in August by CE3ZN. A jaunt to TY, Dahomey by 5V2WT, and 9K3 operation from Kuwait/Saudi Arabia by MP4BHH in October.

ST2SA is on the air using c.w. and will be on s.s.b. when he completes building a recently donated kit. He operates 0330 to 0430z on 14021, 14040 and 14060. Also c.w. on 21033 on Saturdays between 1920-2100z. I understand K4MZU takes a list on 14280 at 0200z, and you can work him cross mode.

HB0AJH operated from 26th July to 1st Aug. from Liechenstein on all bands. QSLs for this operation go to HB0AJH, Paul de Graff, Rue L'Envers 12, CH-2605, Sonceboz, Berne, Switzerland.

K5QHS/KS4 operated from Swan Is. for the first week of July, together with W4VPD/KS4. Unfortunately, one rig broke down in the process, however they continued to have a successful operation. QSLs go to Box 588, Stuttgart, Ark 72160 U.S.A., the call book address being incorrect.

From Comoro Is. comes the news that Yvon FP8CY has been staying with FH8CE and using the call FH8CY. He returned home on 3rd July, but will be back on Comoro in October, and asks that QSLs for the operation go to F8CY.

The QSLs for the very short operation held on Wallis Is. by Thomas FK8DO under the call FW8DO should be sent to him at his home address, which is Thomas Savelli, Box 30, Noumea, New Caledonia.

I have refrained from writing too much about the present jaunt by Gus Browning for one reason, and that is because he moves around so fast that he is usually a couple of jumps ahead of the news sheets. He has had his share of bad luck this time, he was forced to return to FH8 after the incoming tide took two drums of fuel out, however he was back in action from Geyser Bank, signing AC0A very soon and by 25th July had made 6,000 QSOs from there. Following this, he ran into some severe storms at sea, during which time he got little sleep and was forced to tie himself into his bunk. Despite this, plus the fact that he had to send flares to a passing tanker for more fuel, he emerged on 2nd July from Farquhar Is. signing VQ9/A/F. There his generator packed up and he was forced to hire another. Next step was for Bienheim Reef and Chagos, where he arrived on the former on 18th July, operating as AC8A/BR, where he planned to remain for a week before sailing over to Chagos for two days. From there he was due to go to Aldabra before reaching the FR7 area.

The Long Is. DX Assn. News Sheet makes a request re the QSL manager for Gus Browning. They would like to emphasise that he is W2MZV not MZB as appeared in some sheets. W2MZV is Herman Bohning, Box 102, Yonkers, N.Y., 10702, U.S.A., and monetary assistance should be drafted to the World Wide Radio Propagation Study Assn.

I note an item in Geoff Watts DX News Sheet to the effect that VK/ZL operators are complaining that they are not having any QSOs at 0000-0600z is the only time we can hear the Indian Ocean at this time of the year. Personally I have not heard a sign of Gus over here in the Eastern States, how about some word from VK6 on the subject?

A recent station which raised the DX eyebrows was 4N3C! he is still on the air at time of writing and is operating from Cleve Is., which is in the Dalmatia area of YU land, around the Adriatic. His QSLs go to YU1BCD.

JD1ABO on Minami Toroshima, formerly Marcus is will work once a week until September to a list compiled by JA1KSO JA1UQP, JA2PJC or JA6CUV/1. The JA station will give the date of the next appearance by the Marcus station, who hopes to be on the three higher bands. QSL to JA1BA. The other operation to Marcus as proposed by KA1B is cancelled.

Despite internal troubles in Jordan, JY1 is still active and has been appearing at around 1700z and working until 2300z into the States. He is working to a list compiled by WA8CPQ and WA2URS. It is believed that JY1/3/4, etc., will appear on the scene shortly.

Bob VE8EWY is doing fine with his DX-pedition in the West Indies. In company with Gary VE8GCO, he operated from July 14-18 from Trinidad, July 20-24 from St. Lucia, July 25-29 from St. Vincent, July 30-31 Trinidad, and August 1-2 from Tobago. QSL to Bob's home QTH for both operators. VP2DAJ heard from Dominica at this QTH near the end of their stay working into ZL, and strangely he was about the only signal on the band.

Some more for the prefix hunters. HU1 was a special prefix used by El Salvador (YS) stations during the WPX Contest, SX0DX was a special station operated by SV1DB from a mountain north of Athens in March, TC2SC was a special call used by TA2SC during the WPX Contest, while XQ1ZN was CE3ZN under the special call for the same event. Brazil really went to town in this contest using ZV, ZW, ZX, ZY and ZZ, and if you want a QSL from any of these, send yours to the corresponding PY call sign. Colombia, not to be outdone, substituted 5J1 for the normal HK prefix during the Contest.

A note in "Monitor" from Boles W9VZP, pointing out that he is not the QSL manager for HL9KH, although he did handle cards for Don Miller when he operated the station from Nov 1962 to Dec 1963. Since then the call has been issued to the Osan Amateur Radio Club, and QSLs should go to Director of Amateur Operations, HQ US Forces, Korea, APO San Francisco CA 96301 U.S.A.

IZ1AJ and IZ0AJ were the calls used by I1AJ during his vacation to Ponza in mid May. Amateur QSLs should go to VE3ACD, while S.w.l. reports will be handled by I1AJ direct.

UW0IK, whose signals pound in here on 15 and 20 metres, is situated in Asiatic Russia Zone 19. Usually heard on 21303 s.s.b.

All Amateurs who followed the voyage of Thor Heyerdahl in his reed-boat "RA 2" across the Atlantic, were pleased to hear of his safe arrival in Barbados a few weeks ago. Quite a number of contacts were made with Amateur stations during the voyage.

FK8KAA has been putting a bumper signal out of late. Although a little rough around the edges, his c.w. signal is getting out very well, and is on nearly every evening around 0700 on 20. His address is Box 38, Nouman, New Caledonia, handle is Francois.

Another station noted quite regularly in the late evenings is YB1BC with a very good c.w. signal on 20 metres. Says QSL to Box 388, Bandung, Indonesia Rep.

For the /MM hunters, or mobile award chasers, there are several on at present. K7LRA/MM, G3JFF/MM, WB8FBT/MM and W4ZW8/MM have been amongst the regulars heard at about 1900z. L7LRA/MM often appears on 40 metres working a group of /MMs.

CR3AJ will be going QRT and returning to Lisbon on 30th July. Outstanding QSLs should go to Horatio Goncalves Torres, Dua Luis Camoes, Vila Sobral 10, Laranjeiro, Portugal.

IT1SEZ/IF, Silvano, has been reported on 20 s.s.b. in the evenings. He is QRV from Favignana Is. in the Egadi group. QSLs to go to Silvano Amenta, Box 143, Palermo, Sicily.

Some KG6 information to hand, firstly KL7DTH/KG6 wants his QSLs sent to Charles L. Wareham, C/o. R.C.A. Global Communications Inc., Box EH, Agana, Guam, 96910. KG-6SY is on from the Marianas and asks for QSLs to Box 209, Capitol Hill, Saipan, Marianas Is., 96950.

Two stations have been active from San Marino recently, they are M1B whose QSL manager is WA3HUP for all stations other than U.S. His manager for U.S. stations is WA9HYS. The other is M1I, whose cards should go to I1BNZ.

A note on the bottom of Geoff Watts News Sheet of 14th July to the effect that EA9, Ifni, was incorporated into Morocco on 30th June and ceased to be a separate D.X.C.C. country as from 14th May, 1969. A.R.R.L. D.X.C.C. I presume.

QTH SECTION

CR4BC—C.P. 38, Sao Vicente, Cape Verde Is.
CR6FR—C.P. 7, Cabinda, Angola, West Africa.
CT1WA C.P. 448, Porto, Portugal.
CX6BBS—Apto 834 Montevideo Uruguay.
EA8HB—Cas 347 Las Palmas, Gran Canaria, Canary Is.
ET3ZU Box 379, Asmara, Ethiopa.
FR7ZW Box 783 St Denis, Reunion Is.
OD5EJ Box 5148, Beirut, Lebanon.
TT2WKI Box 21 U.S. Navy Stn. F.P.O. New York 09871 U.S.A.
YB2AG Box 88, Semarang Java, Indonesia.
YB3DC—Box 27, Surabaja, Java, Indonesia.

My thanks this month to George Studd, ZM3AFZ, Long Is. DX Assn., Geoff Watts DX News Sheet, Stewart Foster of the I.S.W.L., "Monitor," Stew W1BB, and Bernard Hughes of G-land. 73 for the present, and how about some news from the VK gang?—Don L3022.

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON—SO SHOULD A LOT MORE AMATEURS!

FEDERAL AWARDS

W.A.V.K.C.A. AWARD

The following Amateurs have received this Award during the period 1/7/69 to 30/6/70:

Cert. No.	Call	Cert. No.	Call	Cert. No.	Call
371	W8GUZ	388	WA2FQG	406	HR1WSG
372	VS6AL	389	JA1HBM	407	W8HUR
373	G3TXF	390	VS6FX	408	9J2GJ
374	HB9NL	391	JA1DFQ	409	JA2AYC
375	FR7ZG	392	VE4ZX	410	VO1CU
376	JA4SZ	393	UA0JU	411	JA8GR
377	G3XBR	394	W5ESI	412	JA4FM
378	WB6UJO	395	YA1HD	413	JA6YG
379	W6ZC	396	WB6DXU	414	ZL2FA
380	DL8VF	397	JA5LI	415	VE3OI
381	ZL1BDW	398	ZL3QN	416	W8YRA
382	OE2EGL	399	JA2AYX	417	UQ2AN
383	CR8AI	400	HB9AHA	418	UA0KJA
384	8P6AZ	401	JA1IZ	419	ZL1BDN
385	G3VYF	402	CR7IZ	420	JA8SW
386	ZL1AFQ	403	DJ1VS	421	JA1RWU
387	CT1BH	404	JA7QJ/1	422	JA1AAT
		405	JA1GTF		

W.I.A. 52 MHz. W.A.S. AWARD

Amendment

Cert. No.	Call	Additional Countries
78	VK3ZNJ	3

COOK BI-CENTENARY AWARD

The following additional stations have qualified for the Award.

Cert No.	Call	Cert. No	Call	Cert. No.	Call
467	G3VOF	496	G3OLY	525	OK1BY
468	W1SWD	497	JA1HVS	526	AX2LT
469	WA9WXL	498	W6ISQ	527	AX3BPN
470	ZM2MY	499	DK3FX	528	AX4PX
471	W2CVY	500	VE1AI	529	K4IUV
472	W2BBK	501	AX3ZJ	530	K3RPY
473	ZS5OA	502	AX3TV/M	531	W2TGN
474	W3DJZ	503	ZM1AKY	532	W1AGA
475	VE5PB	504	WA8FYL	533	ZM1BIN
476	ZM1AFQ	505	PA0HBO	534	W8BQV
477	G4JZ	506	ZM2AWH	535	AX7EB
478	VE3LH	507	W9GJG	536	WA7DRP
479	AX3UV	508	VE3AVR	537	PA0ALO
480	ZM1BDW	509	VE3BYN	538	W8PQD
481	G2NH	510	VE3GGU	539	KL7GJM
482	W4HNO	511	AX2AJY	540	ZM3SL
483	AX6VK	512	OE2EGL	541	VE3DAY
484	WA0VJO	513	W3MP	542	W4BA
485	4S7DA	514	K3PAW	543	W4CYC
486	G8GP	515	MP4BBA	544	ZM1AIW
487	W2PPG	516	VE3CZC	545	UW9PT
488	DL9DE	517	AX4UL	546	UG8AW
489	ZM1AID	518	W7VSE	547	UW0IE
490	W0WO	519	I1FO	548	ZM1BCH
491	K1NJE	520	I1RC	549	VE3EA
492	W1AXA	521	ZM4KM	550	AX3JS
493	W8KWO	522	VE3EOX	551	WA2KSA
494	W5OU	523	VE1CV	552	W0WVO
495	K4NE	524	DM2AUO	553	ZM1AJU

— • • • —

CONTEST CALENDAR

3rd/4th October: VK-ZL-Oceania DX Contest (phone).
10th/11th October: VK-ZL-Oceania DX Contest (c.w.).
10th/11th October: R.S.G.B. 28 MHz. Phone Contest.
24th/25th October: R.S.G.B. 7 MHz. DX Contest (c.w.).
7th/8th November: R.S.G.B. 7 MHz. DX Contest (phone).
14th/15th November: R.S.G.B. 1.8 MHz. Contest.
5th Dec. 1970 to 11th Jan. 1971: Ross A. Hull V.H.F. Memorial Contest.
13th/14th Feb., 1971. John Moyle Memorial National Field Day Contest.

D. H. Rankin, F.E.

Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

"IMPRESSED BY THE KINDNESS AND GENEROSITY"

Editor "A.R.," Dear Sir,

May I through the pages of "Amateur Radio" be permitted to thank all the many Australian Amateurs who have made my two recent visits to parts of your country so enjoyable.

I first visited Australia last November in the Far East Flagship, H.M.S. "London," when we spent a week each in Hobart and Melbourne, and two weeks in Sydney. This year the Flagship H.M.S. "Blake" paid visits to Adelaide and Sydney, where we had the honour of being present for the Cook Bi-Centennial celebrations with H.M. The Queen.

During both visits I have been impressed by the kindness and generosity of the "VK gang" and have enjoyed the hospitality of many homes and rigs. The contacts I have made have also been strengthened by further contacts over the air whilst I have been travelling around the Far East.

To list all those who contributed to making my visits so memorable would fill a log book, but may I record the following Amateur call signs and names who will always remain uppermost in my memory:

VKs 2BJL, 2BPN, 2VN, 3XB, 3KS, 3CDR, 5RG, 5DS, 5FM, 7GC, 7DK, 7KJ and 7AZ. Also S.w.l's Eric Trebilcock and Keith Hatch.

To them, and many more, once again my thanks for presenting Australia and her people in such good light. I hope to renew the acquaintances from time to time through Amateur Radio.

73 es DX to all, de Mike.

—G3JFF/MM; ex VS1HU, 9M2MA, VR1M, VR2EA, YJ1MA, ZB2AM, etc.
Chief Radio Supervisor M. J. Matthews, Staff of F.O.2.F.E.F., S.F.M.O. Singapore.

"SERIES A.C. CIRCUIT"

Editor "A.R.," Dear Sir,

Herewith a few comments on Mr Cullinan's article, "Series A.C. Circuit" ("A.R.," Aug. 1970), some statements in which could be misleading.

1. Impedance is not a.c. resistance. Impedance is the combined opposition to current flow of resistance and reactance. A.c. resistance is d.c. resistance plus the added effects of eddy currents, hysteresis and skin effect.

2. Pythagoras states:

Hypotenuse^2 equals (side a)^2 plus (side b)^2 not,

Hypotenuse^2 equals (side a plus side b)^2

There is quite a difference!

3. j (lower case) is an imaginary number, the square root of —1. You can go a long way in radio theory without worrying about this fellow.

4. The product of volts and amperes in a reactive circuit gives apparent power only. This, it would seem, is what the question calls "total power". So Mr Cullinan's calculations are in order here, but the 8,530 are volt-amperes, not watts.

5. Phase depends on the load, not on the generator. A generator delivers a voltage. The type of load that voltage is connected to determines whether the current will lead, lag, or be in phase with the voltage.

6. You pay for true power used, but not for reactive power. The supply authorities require the consumer to keep the power factor as near unity as possible, as otherwise a given amount of power requires more current, which is not paid for, but which nevertheless represents I^{2}R losses in the transmission lines and for which the supply people have to pay. Out of phase current however does no work for you, as it is not backed up by voltage.

7. Since the power factor was not specifically asked for in this problem, the true power could more readily have been calculated from P equals I^{2}R, equals 17.06 x 17.06 x 25, equals 7273 watts.

A point of interest here is that neither the inductance nor the capacitance dissipates power; any heating of these components is due to their a.c. resistance.

G. Craggs, VK2AYG.

PROJECT AUSTRALIS

The Institute and Project Australis is most appreciative of a donation of $200 recently received from the Commonwealth Banking Corporation.

This donation will be applied of course to the present project and we hope that the members and even non members of the Institute will be moved to make contributions to a project which users in a new era of communication available to the Amateur Service.

HAMADS

Minimum $1 for forty words.
Extra words, 3 cents each.

HAMADS WILL NOT BE PUBLISHED UNLESS ACCOMPANIED BY REMITTANCE.

Advertisements under this heading will be accepted only from Amateurs and S.w.l.s. The Publishers reserve the right to reject any advertising which, in their opinion, is of a commercial nature. Copy must be received at P.O. 36, East Melbourne, Vic., 3002, by 5th of the month and remittance must accompany the advertisement.

FOR SALE. A.r Dux Coils, large selection going at half our cost to clear stocks. Type DC11 Crystals at 25 cents each, large range, large stock. Send s.a.e. for spec's to W.I.A., VK7 Division Equipment Store, Box 651J, G.P.O., Hobart, Tas., 7001.

FOR SALE. Galaxy V Mark 3 Transceiver, as new. $370. Don't miss this bargain. VK5OD, 3 Hay St., Kadina, S.A., 5554.

FOR SALE. Star 700A, full set crystals for Amateur and gen. coverage. $300. 93-6909 (Melb.).

FOR SALE: Vinten STR8R VHF Base Receiver in good condition. $55. Ph. 69-4997 (Melbourne area).

FOR SALE: Yaesu FR50 with spkr., $140. Heathkit "Mohican" GC1C rx $100. Commercial 2 mx Converter with FET pre-amp. and 69.5 MHz xtal, $25. Pr. Selsyns, $5. VK3ZNN, V. McDonald, 272A O'Hea's Rd., Pascoe Vale, Vic., 3044.

JOHNSON Viking Courier, excellent condition, 500 watt p.e.p. linear, self contained power supply, $125. K. Lowe, 24 Phipps Cr., Diamond Creek, Vic., 3089. Phone 438-1873.

SELL. Eico 753 s.s.b. tri-band Transceiver, excellent condition, less power supply, $200. Also Yaesu Musen FL50 s.s.b. Transmitter with FV50 VFO (five bands), $160. VK4HV, R. Thorn, 349 Margaret St., Toowoomba, Qld. Phone 22227.

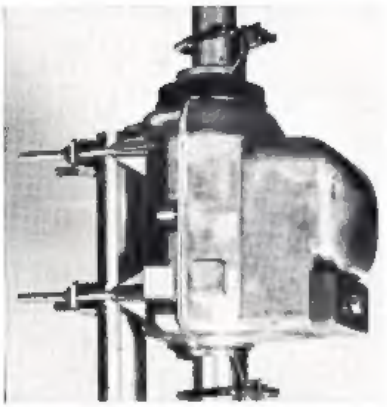
SELL. 400w. p.e.p. Linear Amplifier, bandswitched 80, 40, 20 mx, pr 811s in g.g., needs 60w p.e.p. drive. Complete in table-top cabinet with separate h.v. p.s.u., $65. Telephone 787-2318 (Melb.) during evenings.

WANTED: AVO Characteristic Valve Tester in good condition, pay cash urgent. Mr T. Long, Phone 630-7291, a.h. 38-2463 (Melb.). Pascoe Sale Sth., Vic.

WANTED: One of the following ½ kw. C.C. Spark Transmitters: Marconi types 241C, 341, 368, 558, 355, 355F; Radio Communication Co. types P517, T20, T24, T22, T29 or similar small home-brew equipment. Also quenched plate gap discharger, high voltage mica condensers such as Admiralty pattern 5001 with rating 0.0044 uF, 20,000 volt test. R. F. Fisher, VK3BAQ, 241 Royal Pde., Parkville, Victoria, 3052.

WANTED TO BUY. Transistorised c.w. Tx for 24 volts d.c. supply for 40-20 metres. xtal or v.f.o. Also Type 3 Mk. II and 7Q7 valves. Contact either Jules VK7ZD phone 52-905 (Tas.) or Rex VK2AIK phone 560-8247 (Sydney).

WANTED TO BUY. 5-band s.s.b. Transceiver, prefer Yaesu FT200, FTDX-400 or late model Swan or Galaxy. Must be good and have handbook. Also H/D Rotator and Beam. All replies answered. VK7AR, P.O. Box 90, Devonport, Tas.



Type 2010

Ideal for H.F. and U.H.F. Transmitting Beams

Amateur Nett Price:
$54.33 (sales tax included)
POST FREE
EX STOCK NOW

stolle automatic ANTENNA ROTATOR

THE DRIVE UNIT consisting of:

- Watertight cast housing.
- Hollow shaft to take a revolving aerial mast up to 1½" diameter with double clamping arrangement.
- Bracket for support mast up to 2" diameter.
- High carrying capacity — maximum load 112 lbs.
- Motor shaft bearing lubricated for life.
- Rotating angle of 360° — limited by a stop at the end of rotation.
- Speed of rotation: 1 revolution — 60 seconds.
- Magnetic disc brake and self-restraining worm gear drive hold the aerial in the predetermined direction.
- Torque approximately 100 ft./lbs.

CONTROL UNIT

- Actively styled moulded case.
- Position setting made electronically by rotating the selector knob to the desired direction.
- Operation of unit signalled by indicator lamp.
- Power supply: 220 to 240 volts selectively.
- Motor voltage: 42 volts maximum.
- Power input: 60 watts.
- Control lead: five-core.

DOW-KEY

HIGH PERFORMANCE S.P.D.T. CO-AXIAL RELAYS

The Dow-Key DK60 series of co-axial relays are ruggedly built and individually inspected for complete dependability. Because of the quality and adaptability of the relays, they are now being used in a multitude of applications — including military, industrial, the amateur field, etc.

STANDARD RELAYS WITH TYPE U.H.F. CONNECTORS INCLUDE:

DK60—S.P.D.T. R.F. switch	$22.77
DK60-G—S.P.D.T. R.F. switch with special "isolation" connector in de-energised position	$25.07
DK60-2C—S.P.D.T. R.F. switch with D.P.D.T. auxiliary contacts	$24.53
DK60-G2C—S.P.D.T. R.F. switch with D.P.D.T. auxiliary contacts and special "isolation" connector in deenergised position	$26.76

SALES TAX INCLUDED — EX STOCK NOW — POST FREE

SPECIFICATIONS

R.F. RATINGS: 1 kW. power rating to 500 MHz.

COIL RATINGS: 6, 12, 24, 28 Volts D.C.

V.S.W.R.: Less than 1.15:1 from 0 to 500 MHz. (50 ohm load).

Available from . . .

R.H. Cunningham PTY. LTD.

VIC.	608 COLLINS STREET, MELBOURNE, 3000. Phone 61-2464
N.S.W.	64 ALFRED STREET, MILSONS POINT, 2061. Phone 929-8066
QLD.	L. E. BOUGHEN & CO., 30 GRIMES ST., AUCHENFLOWER, 4066. Ph. 7-4097
W.A.	34 WOLYA WAY, BALGA, 6061. Phone 49-4919